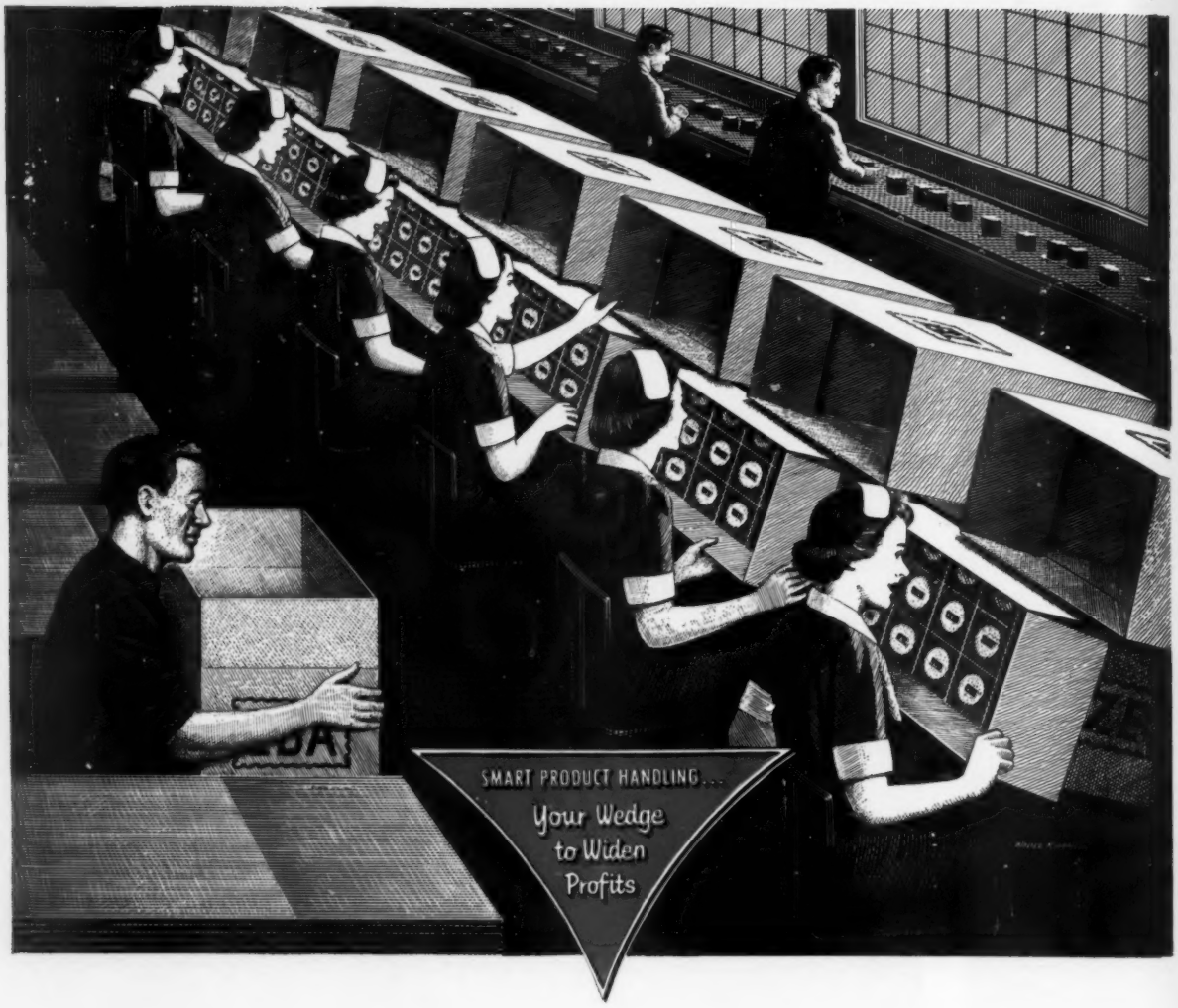
sate transit



Your Packing Line Can Perform More Profitably With Precision-Made Gaylord Boxes

The more efficient you make your packing operations, the more costly every interruption becomes. That's why every Gaylord box is precision made to exact specifications...to assure smooth, continuous operation without jamming or sticking. Very often, the money saved by this increased efficiency in packing more than pays for any difference in original box cost.

Whatever the size, shape or type of container you need, if it's Gaylord-made you can be sure that it will help develop top efficiency in your packing system. For information and cooperation, phone your nearby Gaylord office. You'll find it listed in the phone book.

GAYLORD CONTAINER CORPORATION

SALES OFFICES

Gaylord Boxes

General Offices: SAINT LOUIS, MO.

COAST-TO-COAST

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT BAGS AND SACKS • KRAFT PAPER AND SPECIALTIES

ST-2

APRIL • 1954 finish

safe transit

A monthly trade publication section devoted to improved packaging and shipping and materials handling practices in the home appliance and metal products manufacturing field.

Plant experience information for all executives and plant men interested in the problem of packaging and shipping improvement and loss prevention.

Complete information on the National Safe Transit pre-shipment testing program for packaged finished products, and detailed progress reports of divisions and sub-committees of the National Safe Transit Committee.

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NATIONAL PACKAGING SHOW IN ATLANTIC CITY, APRIL 5-8

More than 25,000 visitors are expected to attend the 23rd National Packaging Exposition to be held in Convention Hall, Atlantic City, N. J., April 5-8. The show is expected to be the largest in AMA history, with some 400 exhibitors of machinery, equipment, materials, and service on hand to show and discuss the latest developments in packaging, packing and shipping.

Some 1200 executives concerned with packaging, packing and shipping are also expected to attend the concurrent National Packaging Conference. Both events are sponsored by the American Management Association.

John A. Warren, packaging consultant, American Home Products Corp., and AMA vice president in charge of the packaging division, will open the conference Monday, April 5, with a picture of some of the latest developments in the field that may have far-reaching importance for industry.

J. Collins Coffee, partner, Management Development Associates, will analyze the scarcity of trained packaging executives and suggest what can be done to fill the gap.

The industrial packaging session, under the chairmanship of Paul O. Vogt, packing, warehousing and shipping consultant, General Electric Co., will offer three examples of packaging improvement for industrial products.

Robert Anderson, packaging methods supervisor, Sperry Gyroscope Co. (division of Sperry Corp.), will describe unusual cushioning, cradling and shipping techniques for delicate precision instruments.

Ray A. Tritten, chief factory engineer, Carrier Corporation, will describe how the package evolves with the product. In some cases, Tritten will point out, the product has been changed to conform to suggestions of the packaging engineers, resulting in savings and more adequate protection.

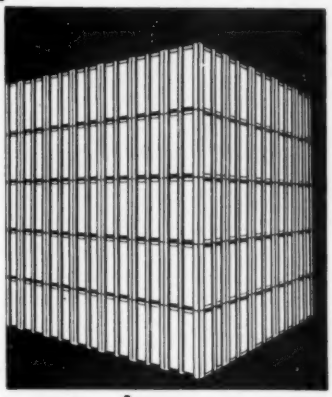
B. R. Sackett, assistant sales executive, SKF Industries, Inc., will report on what his company has done about storing, corrosion prevention, labeling, cartoning, and adapting machinery for hand packing.

A panel of speakers from Sears, Roebuck & Co., will tell how the "sell" is put into its retail packages. This panel will be headed by Findley Williams, manager of national store planning, package and display, Sears, Roebuck & Co. Other Sears men on the panel include: C. W. Harper, manager of packaging and labeling; G. R. Berger, head of basic research and development; Miss C. von Huben, visual merchandiser, soft-line department; J. B. Penson, chief package designer; and W. G. Warren, copy chief, packaging and labeling division.

Other conference panels will be concerned with packaging at Monsanto Chemical Co. and at Kraft Foods Co.

KIECKHEFER MILWAUKEE

WATKINS CONTAINERS ARE BETTER



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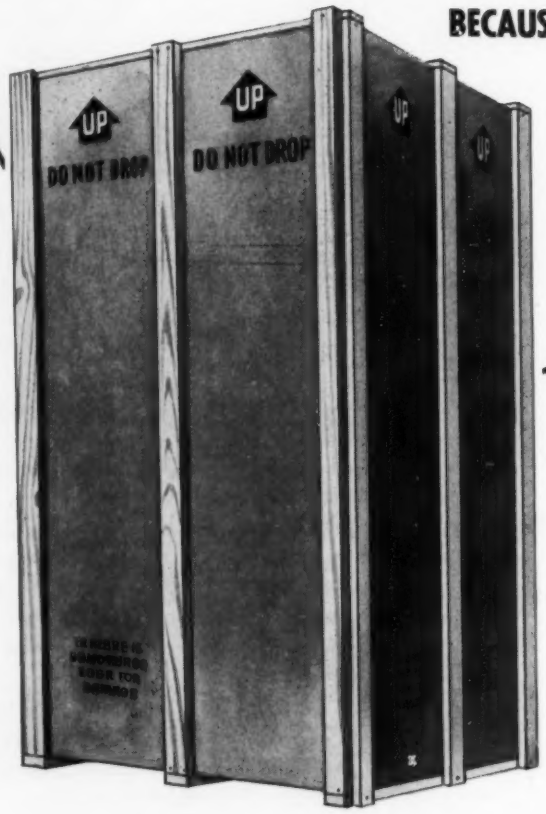

Producers of economical product protection for "around the corner or across the nation". Service includes Pallets, Kieckhefer Paletboxes, Industrial Lumber and specially-designed special-purpose containers.

You receive faster service and better quality as all components are manufactured complete on modern equipment in our own plants.

Cleats are permanently attached to the corrugated board with moisture resistant glue—*under pressure of hydraulic equipment* resulting in smooth interiors with no obstructions to damage the fine finished products.

The tube corners are stapled on automatic equipment insuring close evenly spaced stitches and are additionally reinforced with a special cement.

Skid bases are manufactured for strength. The parts are accurately assembled on new modern nailing equipment. All mounting holes are drilled simultaneously on special equipment insuring absolute accuracy.

Whether your current problem is fragile neon signs, industrial equipment or finished products in volume production—check Kieckhefer-Milwaukee for a practical, economical solution.

PACKAGING ENGINEERS KIECKHEFER MILWAUKEE FOR FIFTY YEARS

KIECKHEFER BOX AND LUMBER CO.

• WOODEN BOXES • BOX SHOOKS • CRATES • CLEATED FIBRE SHIPPING CONTAINERS •

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m Protection
FOR YOUR
WASHING MACHINE

Handling shocks are resisted by the wood cleats, glued tube mat construction.

WATKINS has the container for your shipping problem

Watkins Containers provide—stacking strength—ease of assembly—minimum shipping weight, thus reduced shipping costs—smooth staple-free interiors—easy handling—minimum of storage space needed—protection from dust and dirt—resistance to "weaving" and shock—"Traveling Billboard" feature for product identification and advertising.

For home appliances, for *all* types of finished products, the Watkins Container is your best insurance for safe delivery. Ship your carefully manufactured products safely and economically—ship them the "WatkinsWay."

these companies build WATKINS containers

Cornell Paperboard Products Co. . . . . 1514 E. Thomas Ave., Milwaukee, Wis.
Cozier Container Corp. . . . . . 446 East 131st Street, Cleveland, Ohio
Crate-Rite Mfg. Corp., Division of Pacific Parts Ind. Inc. . . . . . 10901 Russett Street, Oakland, California
Dura-Crates, Inc. . . . . . 940 East Michigan Street, Indianapolis, Indiana
General Box Co. . . . . . 1825 Miner St., Des Plaines, Illinois, and 16th and Maple Sts., Louisville, Kentucky
Homb & Martin Mfg. Co. . . . . . Watseka, Illinois
Illinois Box & Crate Co. . . . . . 811 Center Street, Plainfield, Illinois
Kieckhefer Box & Lumber Co. . . . . 1715 West Canal Street, Milwaukee, Wis.
Lane Container Corp. . . . . . 10212 Denton Road, Dallas, Texas
Lewisburg Container Co. . . . . . 243 Singer Street, Lewisburg, Ohio
Livingston Wood Manufacturing, Ltd. . . . . . Tillsonburg, Ontario, Canada
Love Mfg., Inc. . . . . . 608 South Commerce Street, Wichita, Kansas
Pennsylvania Box & Lumber Co. . . . . 2331 N. Bodine St., Philadelphia 33, Pa.
Utility Crate Corporation . . . . 1985 E. 16th Street, Los Angeles 21, California

—an inquiry to any of these companies will get prompt attention—

The · WATKINS CONTAINER · Manufacturers

Streamlined crating for shipment

by Gilbert C. Close • WESTERN EDITOR

1. *When an order is ready for shipment, it is grouped on a cart, then moved to crating department where a checker goes over the order, and arranges it to approximate the dimensions of the container. A trained crating estimator (shown in photo) then determines size and type of container needed. He then fills out a "box data card", noting gross dimensions, gross weight, gross cube, box component dimensions, and the type of material to use.*

Exclusive feature
safe transit

Few if any shipping departments are faced with a greater array of problems than those that exist in the average airplant shipping department. Edward E. Burket, foreman of the crating department at the El Segundo Division of Douglas Aircraft Co., El Segundo, Calif., lists the major problems as follows:

1. Spare parts, numbering into the hundreds of thousands, must be properly crated and shipped.

2. These spares vary from peanut-size to proportions of a large airplane wing or fuselage section. Weight varies from a few ounces to many tons.

3. All crating must be according to government specifications, and these specifications vary for overseas and domestic shipments.

4. All parts must be packaged or crated in a manner to preserve the in-built high quality characteristics of all aircraft components. Destruction of this quality during shipment might cost a plane and many lives.

5. Some parts no larger than a man's fist, such as a delicate instrument, may be valued at thousands of dollars.

"I feel quite certain that in the solution of these problems, we have developed techniques and methods that can be utilized in any industry where safe transit problems exist," stated Burket. "Our major problem is one of safe transit — not aircraft production."

To eliminate confusion that might be generated by the problems involved, the Douglas crating department operates on rigid routine. Key personnel are maintained at strategic positions on the crate production line to anticipate and solve problems as they occur. Precision-type machines are employed. Inspection is constant and rigid.

The photos accompanying this article, along with the detailed captions, provide a comprehensive picture story of how the Douglas crating department operates. It will be noted immediately that many of the techniques and machines employed could be easily adapted in any up-to-date shipping department.

2. *Box data card then goes to this circular saw table where framework for container is cut according to the instructions. (Note box data card in clip directly in front of the saw operator.) Box data card next goes to panel sawing machine. Panels cut by this saw are then joined with framework components for each box, and entire "package" is forwarded for final construction.*

3. *After leaving the saws, the box packages for standard size crates are routed to this automatic nailing machine which will drive up to 18 nails in a single operation.*

packaged crate components
ecial boxes are routed to
ailing tables for final fabri-
These tables, each 5 by 12
ize, may be moved together
larger units such as the 10
t. table shown in the photo.
of the special boxes are so
hat additional nailing room
ired. A few shipments must
ed outdoors due to interior
space limitations.

5. *Here arresting hooks for ship-based Navy attack bombers are being crated. Note the careful, moisture-proof wrapping used on each hook. Corrosion prevention is a major problem in overseas shipment of metal parts. If one of these hooks were to become badly corroded, and thus weakened, it would be useless. Full hook strength is required to safely "stop" the airplane as it comes in to a carrier deck landing at speeds ranging upward to 80 mph.*

fter crate fabrication, the crates move into
packing department and are correlated with
order for which they were originally estimated.
his photo, Edward E. Burket is checking on
verseas shipment of delicate glass parts being
ed in shredded blueprints furnished by the
age department. Old and out-dated blueprints
mulate by the thousands in any engineering
rtment. When properly shredded, they pro-
an ideal cushioning material for packing
delicate orders.

ADMIRAL NAMES CURTIS DIRECTOR OF TRAFFIC

William J. Curtis, traffic manager, Admiral Corporation, Chicago, has been appointed director of traffic, a newly-created position. In his new post, Curtis will handle traffic operations for all of the company's plants, divisions, subsidiaries and branches in the United States and Canada.

PACKAGING SERVICE NOW DIV. OF PENNSYLVANIA BOX

J. C. Fleck, manager, Packaging Service Co., Wyncote, Pa., has announced that his company is now a division of Pennsylvania Box & Lumber Co.

Packaging Service will continue with the same personnel, but will be in a better position to offer a more comprehensive container testing service, stated Fleck. As a NST-certified laboratory, test procedures will conform to the requirements of the National Safe Transit Committee, the American Society for Testing Materials, and the U.S. Government.

100 MILLIONTH PINE TREE SEEDLING PLANTED BY GAYLORD

Some 500 guests were on hand recently in Millard, Miss., to watch L. K. Johnson plant the one hundred millionth pine tree seedling on one of Gaylord Container Corp.'s farms.

Johnson started the reforestation program in 1920 when he was a forester with Great Souther Lumber Co. whieh was merged into Gaylord in 1937.

L. J. JOHNSON

H. F. MIDDLETON

MATHEWS CONVEYOR SALES MGR.

L. J. Johnson has been named general sales manager, Mathews Conveyor Co., Ellwood City, Pa. He had been asst. sales manager.

ACME STEEL UPS MIDDLETON

John G. Bucuss, president of Acme Steel Products Division, Acme Steel Co., has announced the appointment of H. F. Middleton as western area manager with offices in Los Angeles.

Wayne U. issues first materials management certificates

EIGHT industrial and commercial materials handling specialists in the Detroit area received the first certificates of attainment in materials manager to be issued by Wayne University's Materials Management Center.

G-E packaging savings cited

Main speaker at ceremonies in connection with the Center's 2nd annual Materials Management Night was Paul O. Vogt, packaging, warehousing and shipping consultant for General Electric Co., who delivered the second in a series of lectures honoring Neil M. Loney, early pioneer and contributor to the developments of the science of materials management.

Vogt discusses General Electric's packaging program begun in 1946. Savings resulting from the program reached $4,770,000 in 1952, and Vogt estimated that 1953 savings to be more than $5,000,000.

These savings were made, he explained, by adopting new, less costly packaging materials, by redesigning interior packing and by attempting to design one-piece packs using paper shrouds instead of rigid cases to package apparatus like turbines and large motors. Redesign of wirebound

Dr. C. B. Hilberry (left), president of Wayne U., awards a certificate of attainment in materials management to Blair L. Kain, of Houdaille-Hershey Corp., while other certificate recipients look on. In photo, left to right, are: Dr. Hilberry; E. F. Steslicki, Chevrolet; W. G. Wood, Ford; Kain; J. E. Blett, DeSoto; A. R. Centille, Detroit Ordnance; L. F. Pastor, Burroughs; and Tad Muraoka, Kramer Bros. Another certificate recipient, S. D. Elliott, Ford, is not in the picture.

GRAND CANYON?

The CANYON-LIKE EFFECT of this picture is created by 4-high stacks of packaged refrigerators in Admiral Corporation's new warehouse at their Midwest Mfg. Corp. plant in Galesburg, Illinois.

Strength for stacking and modern handling before and after safe shipping are "must" requirements. Moisture absorption and material fatigue weakens certain types of packages while in storage. Such weaknesses are overcome by the structural strength of wood as shown in this picture — and at no extra cost.

Proper design by our engineers, tests in a Safe Transit Laboratory and the "know how" of 72 years of progress and experience will produce the box or crate with the right combination of materials for the stacking, handling and safe shipping of your product.

Wirebound,
Nailed or Hinge Corner
Cleated Plywood
Cleated Craveneer
Cleated Corrugated
Watkins Type Containers
Shop and Tote Boxes
Woodsteel Nesting Boxes

★

FOR DOMESTIC OR EXPORT
FOR PEACE OR DEFENSE

A shipping container for every shipping purpose

FOR SAFER TRANSIT BY • TRUCK • BOAT • TRAIN • PLANE

CHICAGO MILL AND LUMBER COMPANY

33 South Clark Street — Chicago 3, Illinois

Plants at: Helena, Arkansas • Greenville, Mississippi • Rockmart, Georgia
Tallulah, Louisiana • South Fork, Colorado • Chicago, Illinois

crates and improved warehousing and shipping techniques added to the savings, Vogt said.

Enrollment increasing

Established in the spring of 1952, the Center now has 400 enrollments. Operating under the direction of Dr. Spencer A. Larsen, the Center has an instructional staff of more than 45 persons, including five Wayne U. instructors, 13 special lecturers and 25 part-time instructors from industrial and commercial organizations.

CERTIFICATIONS FOR INGERSOLL, MC DONALD, TRADE-WIND, AND THREE LABORATORIES

The National Safe Transit Committee has announced the certifications of Ingersoll Products Division of Borg-Warner Corp., Chicago; A. Y. McDonald Mfg. Co., Dubuque, Iowa; and Trade-Wind Motorfans, Inc., Los Angeles.

Newly-certified laboratories include The Nashville Corrugated Box Co., a division of The Mengel Company, and the Container Division of International Paper Co., in both Chicago, Ill., and Whippany, N. J.

29 SAFE TRANSIT LABORATORIES

With other certifications pending, 29 laboratories are already participating in the NST Program.

The certified laboratories include:

American Gas Associations Labs.
Los Angeles, California

Atlas Plywood Corporation
Lawrence, Massachusetts

Bigelow-Garvey Lumber Company
Chicago, Illinois

Chicago Mill and Lumber Company
Chicago, Illinois

Container Corporation of America
Chicago, Illinois

Container Laboratories, Inc.
New York City, New York

Container Laboratories, Inc.
Chicago, Illinois

Cozier Container Corporation
Cleveland, Ohio

Dura-Crates, Inc.
Indianapolis, Indiana

The Fairfield Paper & Container Co.
Baltimore, Ohio (project 1-a only)

Fort Wayne Corrugated Paper Company
Fort Wayne, Indiana

General Box Company
Des Plaines, Illinois

The Hinde & Dauch Paper Company
Sandusky, Ohio

Inland Container Corporation
Indianapolis, Indiana

International Paper Company
Chicago, Illinois

International Paper Company
Whippany, New Jersey

International Paper Company
Georgetown, South Carolina

The Mengel Company
Louisville, Kentucky

The Mengel Company
Fulton, New York

The Mengel Company
Winston-Salem, North Carolina

The Nashville Corrugated Box Co.
Division of The Mengel Company
Nashville, Tennessee

Ohio Boxboard Company
Rittman, Ohio

Package Research Laboratory
Rockaway, New Jersey

Packaging Service Company
Wyncote, Pennsylvania

The Don L. Quinn Company
Chicago, Illinois

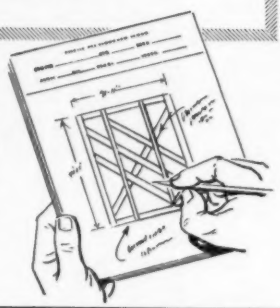
Rathborne, Hair and Ridgway Box Co.
Chicago, Illinois

Twin Cities Container Corporation
Benton Harbor, Michigan

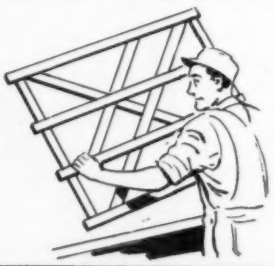
U. S. Testing Company, Inc.
Hoboken, New Jersey

Union Bag & Paper Corporation
Savannah, Georgia

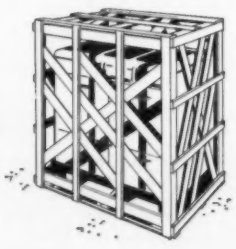
HOW
Special Crate Designing
HELPS SAVE MONEY



1 Crates designed to meet specific needs are usually much more economical than general-purpose crates. For example, Weyerhaeuser designing and engineering has reduced crating costs as much as 40% through lighter weight, easier assembly and simplified nailing.



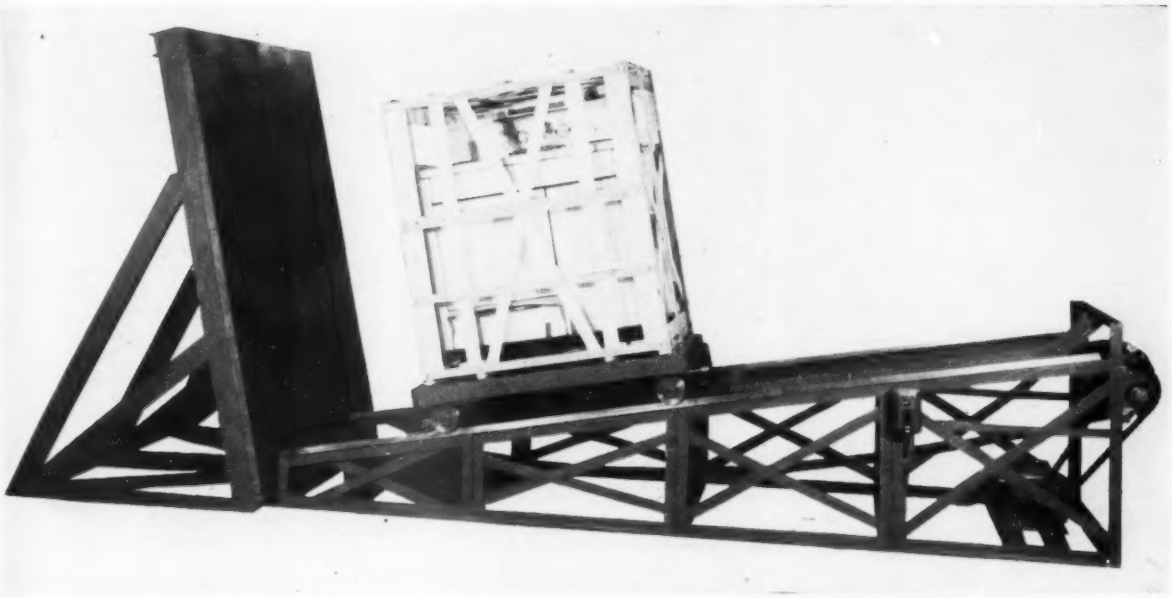
2 Construction and assembly of each section in the laboratory assures accuracy, adequate coverage, economical and practical use of material. You know in advance that Weyerhaeuser crates are rigid and strong, without depending on contents for support.



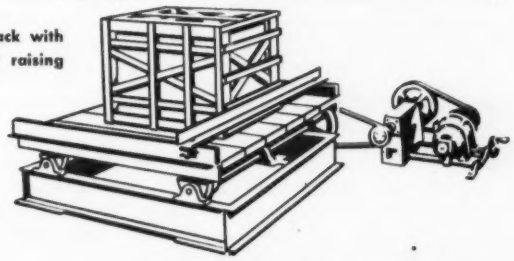
3 This special care in designing means Weyerhaeuser crates are very light for their strength . . . planned for quick, inexpensive assembly, with no pre-drilling. They come neatly bundled for easy handling. Write for a folder on Weyerhaeuser industrial wood parts, or ask for information concerning your particular needs.

Weyerhaeuser Sales Company
Industrial Wood Parts Department
Room 2111 • 400 West Madison • Chicago 6, Illinois

Complete Equipment for your NATIONAL SAFE TRANSIT LABORATORY



Gaynes Incline Impact Tester (NST Approved) — All steel unit has "V" track with four "V", ball-bearing wheels. Provides flexible impact zone control. Power raising and automatic release. Rigid, reinforced, all-steel back stop.



Gaynes Vibration Tester . . .
has all steel construction. Variable-speed, power-driven unit gives accurate control of vibration cycle.

NOW . . . you can get complete equipment for your NST Laboratory from a single source.

1. The only scientifically designed, friction-free Incline Impact Tester.

2. A well-built, long-lasting Vibration Tester.

3. A rigid all-steel Drop Test Unit.

Gaynes Drop Tester . . .
made in varied sizes to suit size of package. All-steel construction. Easily adjusted.

all equipment moderately priced • prompt delivery
phone or write for complete information and prices

GAYNES ENGINEERING COMPANY

1642-52 W. Fulton Street • Chicago 12, Illinois • Telephone HAymarket 1-5257

OVER 30 YEARS' EXPERIENCE IN MACHINE DESIGN AND FABRICATION

147 Safe Transit Certifications

THE following companies are certified under the National Safe Transit Program.

A-B Stoves Division
Detroit-Michigan Stove Company
Detroit, Michigan

Active Tool & Manufacturing Co.
Detroit, Michigan

Admiral Corporation
Chicago, Illinois

AllianceWare, Inc.
Alliance, Ohio

Altorfer Bros. Company
Peoria, Illinois

American Kitchens Division
Avco Mfg. Corp.
Connersville, Indiana

Apex Electrical Manufacturing Co.
Cleveland, Ohio

Appliance & Electronics Division
Avco Manufacturing Corp.
Cincinnati, Ohio

Automatic Washer Company
Newton, Iowa

Barrows Porcelain Enamel Company
Cincinnati, Ohio

Beam Manufacturing Company
Division of Solar Corporation
Webster City, Iowa

The Bellaire Enamel Company
Bellaire, Ohio

Belmont Stamping & Enameling Co.
New Philadelphia, Ohio

Bendix Home Appliances
Division — Avco Mfg. Corp.
South Bend, Indiana

Ben-Hur Manufacturing Company
Milwaukee, Wisconsin

Boston Stove Foundry Company
Reading, Massachusetts

Bryant Heater Division
Affiliated Gas Equipment, Inc.
Cleveland, Ohio

Bryant Heater Division
Affiliated Gas Equipment, Inc.
Indianapolis, Indiana

Bryant Heater Division
Affiliated Gas Equipment, Inc.
Tyler, Texas

Brown Stove Works, Inc.
Cleveland, Tennessee

Calcinator Corporation
Bay City, Michigan

Caloric Stove Corporation
Topton, Pennsylvania

Canadian General Electric Co., Ltd.
Montreal, Quebec, Canada

Canadian Westinghouse Company, Ltd.
Hamilton, Ontario, Canada

Canton Stamping & Enameling Co.
Canton, Ohio

Central Rubber & Steel Corporation
Findlay, Ohio

Chambers Corporation
Shelbyville, Indiana

Chicago Vitreous Enamel Product Co.
Cicero, Illinois

Conlon Bros. Mfg. Co.
Chicago, Illinois

Conlon-Moore Corporation
Chicago, Illinois

Continental Water Heater Co.
Los Angeles, Calif.

Cribben and Sexton Company
Chicago, Illinois

Crosley Division, Avco Mfg. Corp.
Richmond, Indiana

Crosley Division, Avco Mfg. Corp.
Nashville, Tennessee

Crunden Martin Manufacturing Co.
St. Louis, Missouri

Davis Products Co.
Niles, Michigan

Day & Night Division
Affiliated Gas Equipment, Inc.
Monrovia, California

Dearborn Stove Company
Chicago, Illinois

Deepfreeze Appliance Division
Motor Products Corporation
North Chicago, Illinois

Detroit-Michigan Stove Company
Detroit, Michigan

The Dexter Company
Fairfield, Iowa

Dixie Products, Inc.
Cleveland, Tennessee

Dostal & Lowey Company, Inc.,
Menomonee Falls, Wisconsin

The Duchess Company
Alliance, Ohio

Duo-Therm Division
Motor Wheel Corporation
Lansing, Michigan

Eagle Range & Mfg. Company
Belleville, Illinois

Easy Washing Machine Corporation
Syracuse, New York

The Enamel Products Company
Cleveland, Ohio

Fedders-Quigan Corporation
Buffalo, New York

Fedders-Quigan Corporation
Maspeth, Long Island, N. Y.

Federal Enameling & Stamping Co.
Pittsburgh, Pennsylvania

Firestone Steel Products
Akron, Ohio

Firestone Steel Products
Wyandotte, Michigan

The Fletcher Enamel Company
Dunbar, West Virginia

Florence Stove Company
Kankakee, Illinois

Florence Stove Company
Lewisburg, Tennessee.

The Floyd-Wells Company
Royersford, Pennsylvania

Franklin Transformer Company, Inc.
Minneapolis, Minnesota

Frigidaire Division
General Motors Corporation
Dayton, Ohio

General Electric Company
Erie, Pennsylvania

Geneva Modern Kitchens, Inc.
Geneva, Illinois

Globe American Corporation
Kokomo, Indiana

Hardwick Stove Company
Cleveland, Tennessee

Haskell Manufacturing Co., Inc.
Pittsburgh, Pa.

Heintz Manufacturing Company
Philadelphia, Pennsylvania

Holland-Rieger Division
Apex Electrical Mfg. Co.
Sandusky, Ohio

Hotpoint Company
Chicago, Illinois

Ingersoll Products Division
Borg-Warner Corporation
Chicago, Illinois

Ingram-Richardson, Inc.
Frankfort, Indiana

International Harvester Company
Evansville, Indiana

Jordon Refrigerator Co., Inc.
Philadelphia, Penna.

Kaiser Metal Products, Inc.
Bristol, Pennsylvania

Kresky Manufacturing Co., Inc.
Petaluma, California

Kuehne Manufacturing Co.
Mattoon, Illinois

Landers, Frary & Clark
New Britain, Connecticut

The Lennox Furnace Company
Marshalltown, Iowa

A. J. Lindemann & Hoverson Co.
Milwaukee, Wisconsin

Lisk-Savory Corporation
Buffalo, New York

Locke Stove Company
Kansas City, Missouri

Logan Engineering Company
Chicago, Illinois

Luxra Company
Atchison, Kansas

Magic Chef, Inc.
Cleveland, Ohio

Magic Chef, Inc.
Lorain, Ohio

Magic Chef, Inc.
St. Louis, Missouri

Majestic Manufacturing Co.
St. Louis, Missouri

Malleable Iron Range Company
Beaver Dam, Wisconsin

Malsbary Manufacturing Co.
Oakland, California

Manitowoc Equipment Works
Manitowoc, Wisconsin

The Maytag Company
Newton, Iowa

McCray Refrigerator Company, Inc.
Kendallville, Indiana

A. Y. McDonald Manufacturing Co.
Dubuque, Iowa

Meadows Division, Thor Corporation
Bloomington, Illinois

Midwest Manufacturing Company
Division of Admiral Corp.
Galesburg, Illinois

Moffats, Limited
Weston, Ontario, Canada

The Moore Enameling & Mfg. Co.
West Lafayette, Ohio

Mt. Vernon Furnace & Mfg. Co.
Mt. Vernon, Illinois

Murray Corporation of America
Scranton, Pennsylvania

Murray Manufacturing Company
Murray, Kentucky

Nash-Kelvinator Corporation
Grand Rapids, Michigan

Neon Products, Inc.
Lima, Ohio

Nesco, Inc.
Milwaukee, Wisconsin

Newark Stove Company
Newark, Ohio

Norge Division, Borg-Warner Corp.
Effingham, Illinois

Norge Division, Borg-Warner Corp.
Herrin, Illinois

Norge Division, Borg-Warner Corp.
Muskegon Heights, Michigan

Odin Stove Manufacturing Co.
Erie, Pennsylvania

O'Keefe & Merritt Company
Los Angeles, California

Payne Furnace Division
Affiliated Gas Equipment, Inc.
Monrovia, California

Peerless Manufacturing Corporation
Louisville, Kentucky

Perfection Stove Company
Cleveland, Ohio

Philco Corp., Refrigerator Division
Philadelphia, Pennsylvania

Prentiss-Wabers Products Co.
Wisconsin Rapids, Wisconsin

Quincy Stove Mfg. Co.
Quincy, Illinois

Ranney Refrigerator Company
Greenville, Michigan

Remington Corporation
Auburn, New York

Republic Stamping & Enameling Co.
Canton, Ohio

Revco, Inc.
Deerfield, Michigan

Reznor Manufacturing Company
Mercer, Pennsylvania

Rheem Manufacturing Company
Chicago, Illinois

Geo. D. Roper Corporation
Rockford, Illinois

Milton Roy Company
Philadelphia, Pennsylvania

Ryan Refrigeration Company
Hopkins, Minnesota

Samuel Stamping & Enameling Co.
Chattanooga, Tennessee

Seeger Refrigerator Co.
Evansville, Indiana

Seeger Refrigerator Co.
St. Paul, Minnesota

Servel, Inc.
Evansville, Indiana

Shampaine Company
St. Louis, Missouri

A. O. Smith Corporation
Kankakee, Illinois

Speed Queen Corp., Ironer Division
Algonquin, Illinois

The Tappan Stove Company
Mansfield, Ohio

Temco, Inc.
Nashville, Tennessee

Thor Corporation
Chicago, Illinois

Trade-Wind Motorfans, Inc.
Los Angeles, California

United Specialties Company
Philadelphia, Pennsylvania

United States Rubber Company
Fulton, New York

United States Stamping Company
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Universal Major Elec. Appliances, Inc.
Baltimore, Maryland

Victor Products Corporation
Hagerstown, Maryland

Westinghouse Electric Corporation
East Springfield, Mass.

Westinghouse Electric Corporation
Metuchen, New Jersey

Westinghouse Electric Corporation
Columbus, Ohio

Westinghouse Electric Corporation
Mansfield, Ohio

Westinghouse Elec. Corp.,
Beaver, Pa.

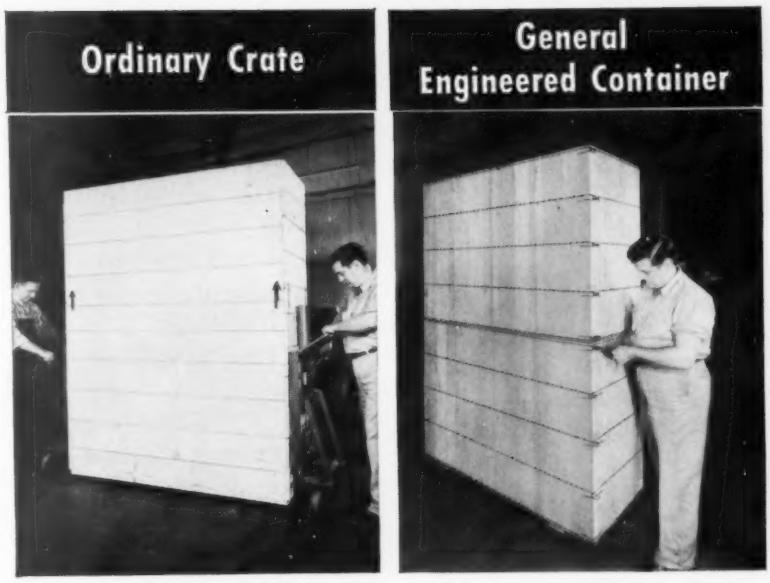
Westinghouse Electric Corp.
Sunbury, Pennsylvania

S. S. White Dental Mfg. Co.
Staten Island, New York

John Wood Company
Conshohocken, Pa.

York Corporation
York, Pennsylvania

Question: is there a difference between these two shipping containers?



Answer: There is... and it was worth $8,000 a year to The Foxboro Company!

...and the difference is General Container Engineering. Both containers hold a 925-lb. instrument cabinet. Both *protect* its precision instruments and satin finish during handling and shipment. Yet the one on the left weighs 400 lb. empty, takes two men and six man-hours to pack. While the General Engineered Container on the right weighs only 170 lb., can be packed by one man in just an hour and a half—*costs 42% less* than the container on the left.

This outstanding dollar saving is the result of painstaking work in well-equipped packaging laboratories—where each container is designed and tested to fit the needs of each product—perfectly. You can get this service without charge, and without obligation. Write for details. And send for your free copy of "The General Box." It's loaded with cost-saving packaging ideas.

ENGINEERED CONTAINERS FOR EVERY SHIPPING NEED

Factories: Cincinnati, Denville, N.J.; East St. Louis; Detroit; Kansas City; Louisville; Milwaukee; Prescott, Ark.; Sheboygan; Winchendon, Mass.; General Box Company of Mississippi, Meridian, Miss.; Continental Box Company, Inc., Houston.

General Box

GENERAL BOX COMPANY, 1823 MINER STREET, DES PLAINES, ILL.

★ ★ ★ ★ ★

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Customer Service 360 N. MICHIGAN AVE., CHICAGO 1, ILLINOIS

"I saw your ad in finish"

CLASSIFIED ADVERTISING

EQUIPMENT WANTED

Wanted to buy complete tooling outfit for the manufacture of washing machines; presses and dies for sinks and lavatories.

COMISIONISTAS DE MONTERREY, S.A.
Apartado Postal #909
Monterrey, N.L., Mexico

POSITIONS OPEN

SERVICE REPRESENTATIVE

OPPORTUNITY FOR SALES

Outstanding opportunity in St. Louis, Mo., with rich financial reward, for young or middle-aged man experienced in industrial finishing methods, metal especially. Must be capable of doing field service work. Prefer experienced sprayer, finishing foreman or superintendent. Opportunity for early entry into highly remunerative sales work. Reply with resume. Strictly confidential.

Address reply to Box 454, c/o *finish*, 360 N. Michigan Ave., Chicago 1, Ill.

SALES OPPORTUNITY

Progressive New Jersey manufacturer of industrial synthetic and lacquer finishes would like to talk with a sales-minded man of preferably 30-35 years of age, who has reasonable knowledge of fundamentals of industrial finishing. More important than intimate detailed experience, we consider integrity and self-reliance, disposition to work steadily and intelligently. Compensation and expense allowance will be more than adequate.

The successful man will take over substantial established business in northern New Jersey area.

Our staff knows of this advertisement, and will give the new man the fullest cooperation.

Forward complete resumé of personal and business background.

Address reply to Box 454-B, c/o *finish*, 360 N. Michigan Ave., Chicago 1, Ill.

CERAMIC ENGINEER

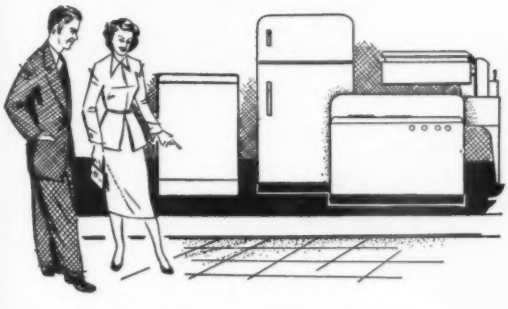
For control work in Enamel Department of midwest major appliance manufacturer. Send full details of experience, salary, etc. Replies confidential.

Address reply to Box 454-A, c/o *finish*, 360 N. Michigan Ave., Chicago 1, Ill.

this "lifetime finish" helps spark sales

Now that buyers of appliances are becoming "shoppers" again, you can give your products a big lift in the race for sales by designing with Porcelain Enamel.

CUSTOMERS COME BACK

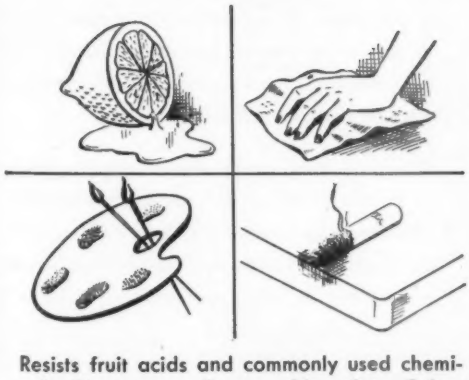


This beautiful finish that "lasts a lifetime" offers your customers longest service at less cost. It is a big reason why Porcelain Enamel attracts so many customers for all kinds of products.

STAND-OUT FINISH

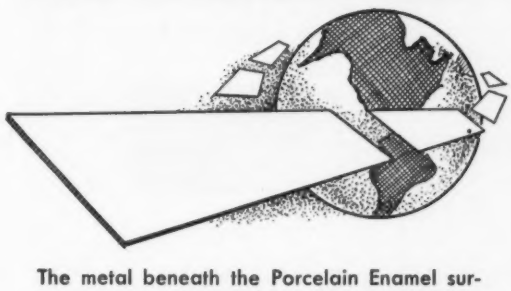
A Porcelain Enameled finish on your appliances and other household equipment offers so many unusual advantages that it *stands out* as a sales-aid in comparison with other finishes.

CHECK THESE FEATURES



Resists fruit acids and commonly used chemicals. Cleans as easily as a china plate. Colors never "fade" or lose original luster. Forgotten cigarettes can't harm its hard glossy surface.

"WORLD'S STANDARD"



The metal beneath the Porcelain Enamel surface must have excellent bonding qualities, flatness, and uniform characteristics. That is why more manufacturers have used more Armco Enameling Iron over a longer period than any other enameling base. That is why, too, it is known as the "World's Standard Enameling Iron."

ARMCO STEEL CORPORATION

3573 Curtis Street, Middletown, Ohio • Export: The Armco International Corporation

ARMCO

it's as easy as this...

FOR **PREWAY Inc.**

PERMA-VIEW

the window you can see through always!

"out of our carton— into your door"

Yes sir, it's as easy as this. The PERMA-VIEW oven door window comes to you ready for immediate installation in your range — to add a sales feature second to none.

The strong steel encased, double pane PERMA-VIEW window incorporates the finest quality heat resisting glass. It is mechanically sealed to prevent infiltration of vapors and to eliminate "fogging." This "non-fog" window meets the constantly growing demand for "visible baking."

More and more range manufacturers are turning to PERMA-VIEW as a practical, economical and effective sales feature for their new models. We will gladly work with your engineering department in adapting its use to your range. Write or phone for complete information.

Phone MArket 4-2256

● PREWAY INC. now offers PERMA-VIEW in 30" electric ranges and will soon incorporate the PERMA-VIEW window in two more lines.

MILLS PRODUCTS, INCORPORATED

1015 W. MAPLE ROAD • WALLED LAKE, MICHIGAN

May • 1954

VOL. 11 • NO. 5

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MONTHLY TRADE PUBLICATION
Established January 1944
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•

A trade publication devoted to the interests of the metal products manufacturing industry with special editorial attention to home appliances. Includes technical and practical information on plant facilities and manufacturing problems from raw metal to safe delivery of the finished product, with special emphasis on fabrication, metal preparation, metal finishing, assembly, and packaging and shipping.

Free controlled circulation to management, purchasing, engineering and key plant personnel in metal product manufacturing plants. To others, subscription price is $5.00 per year, domestic. To all other countries $8.00 per year (U.S. funds).

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BPA NBP

finish

METAL PRODUCTS MANUFACTURING
FROM RAW METAL TO FINISHED PRODUCT

FOR BETTER

"Paint Adhesion"

use

MACCO MACHINE CLEANER NO. 71

a phosphate cleaner and rust inhibitor

Illustration shows two sheets of steel, painted at the same time with the same paint and exposed for months to all kinds of weather. On the left is shown a surface which was cleaned and phosphatized with Macco M.C. No. 71. Note how clear and smooth it appears. On the right, a surface on which ordinary cleaner was used. Note peeling and rust blisters.

A MACCO CASE HISTORY*

As in all fields today, purchasers of metal products are constantly demanding more and more in the quality of their paint finishes.

By far the most efficient and economical method of preparing metals for the finest and most enduring paint job is by use of Macco M.C. No. 71. Laboratory and shop tests prove that, on steel, cast iron, aluminum or die cast, Macco M.C. No. 71 provides a corrosion-resistant phosphate coating comparable in quality to that formerly available only through expensive and elaborate methods of preparation.

TESTED ADVANTAGES OF MACCO M.C. No. 71 CLEANER

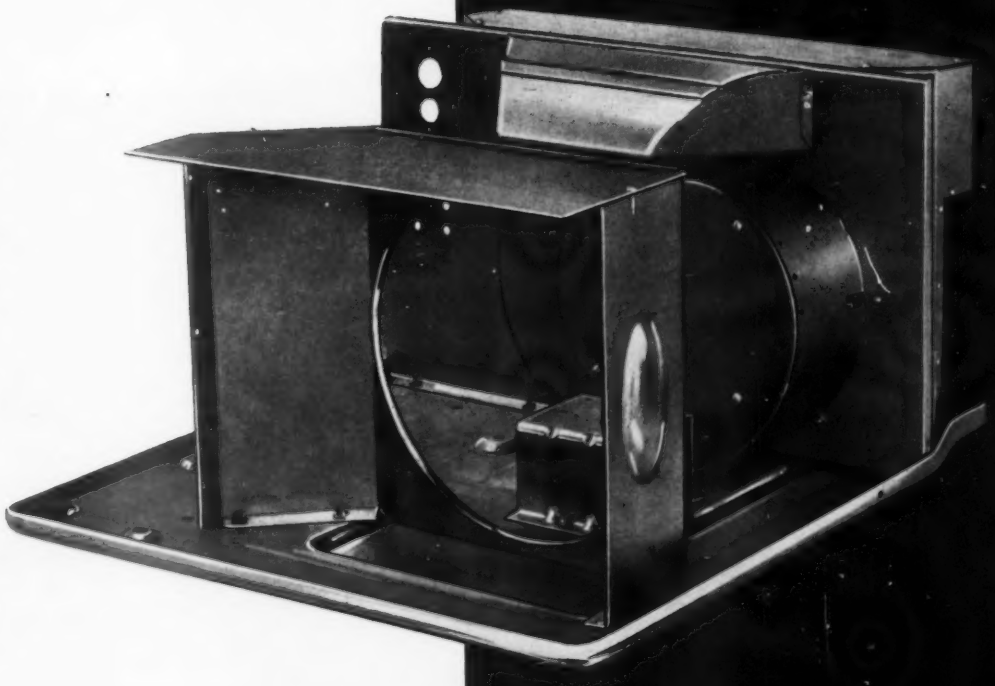
1. Cleans oil, grease, etc. from metals.
2. Etches metal to give better bond for paint.
3. Gives microscopic phosphate coating, greatly aiding in paint adhesion and corrosion resistance.
4. No special equipment required.
5. Never hardens in the drum.
6. Gives excellent protection against rust prior to painting.
7. Assures best possible protection to painted surface.
8. Can be run in conventional one, two, or three stage washers, as well as in other types.

Use Macco M.C. No. 71 Cleaner and Phosphate Coating and add immeasurable quality to the finish of your product.

* Actual case history, names, etc. can be had by writing today to

MACCO PRODUCTS COMPANY 9210 SOUTH SANGAMON STREET • CHICAGO 20, ILLINOIS

for
Stampings
Fabrication
and
Spot Welding
see
DANIELSON



These front and back views of mock-up show typical parts of the famous Fresh'nd-Aire room conditioner manufactured by Cory Corp. Each unit has approximately twenty-four parts made by Danielson for the Cory Corp.

Whether you need a single stamping or a complete assembly, let us show how we can fit into your production schedule, to your *advantage!*

Write — 'phone — or wire us today!

V. W. DANIELSON
MANUFACTURING COMPANY
3360 W. HOPKINS ST. • MILWAUKEE 16, WISCONSIN • Phone CUSTER 3-3800

SAVE
Time and Money
with DANIELSON

$500 for a butter dish?

Nobody is going to pay $500 for a butter dish . . . but every day hundreds of housewives pay that much for a new refrigerator. $500 is a lot of money to a housewife. You can be sure she's going to do a lot of checking and comparing before she buys. And the final decision between your product and another may well hinge on some seemingly insignificant feature . . . such as a butter dish.

Lancaster glass butter dishes have the features which will win the housewife's favor. Sparkling in appearance. Easy to clean. Resistant to heat stains and scratches. Glass is hygienic —can't absorb food odors. They're sales clinchers.

Now look at the $500 from another angle. Butter dishes can cost you that — and a lot more —if you don't have them when you need them. A small item, yes, but still you can't ship a refrigerator without it.

That worry, too, is eliminated when you use Lancaster glass butter dishes. Lancaster's facilities are devoted entirely to custom production. No stock line requirements can sidetrack your order. You can count on Lancaster to deliver the quantities you need, when you need them. The price will be right, too.

For all the details on how Lancaster production is ideally geared to meet your needs for appliance glass of all kinds, clip this coupon and mail it today.

LANCASTER GLASS

THE Lancaster Lens co.

Lancaster, Ohio

☐ Our specifications are attached. Please give us an estimate of costs on the following quantities:_____

☐ Please send me literature covering Lancaster service to the appliance industry.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

see our catalog in S PRODUCT DESIGN FILE or write for copy

MEETINGS

WELDING EXPOSITION

American Welding Society, spring technical meeting and welding and allied industry exposition, Memorial Auditorium, Buffalo, May 4-7.

ENAMELERS CLUB MEETINGS

Central District Enamelers Club, dinner-meeting, Allerton Hotel, Cleveland, Ohio, May 7.

Eastern Enamelers Club, luncheon-meeting, Sylvania Hotel, Philadelphia, May 8.

Midwest Enamelers Club, annual Maypole Party, Sportsman Golf Club, Chicago, May 21.

LP-GAS CONVENTION

Liquefied Petroleum Gas Association, annual convention and appliance exhibit, Conrad Hilton Hotel, Chicago, May 9-12.

PEI DIVISION MEETINGS

Porcelain Enamel Institute, division meetings, Edgewater Beach Hotel, Chicago, May 12-14.

APPLIANCE TECHNICAL MEETING

American Institute of Electrical Engineers, annual Appliance Technical Conference, Morrison Hotel, Chicago, May 17-19.

OIL-HEAT CONVENTION

Oil-Heat Institute of America, and exposition, annual convention, Philadelphia, May 16-20.

BASIC MATERIALS SHOW

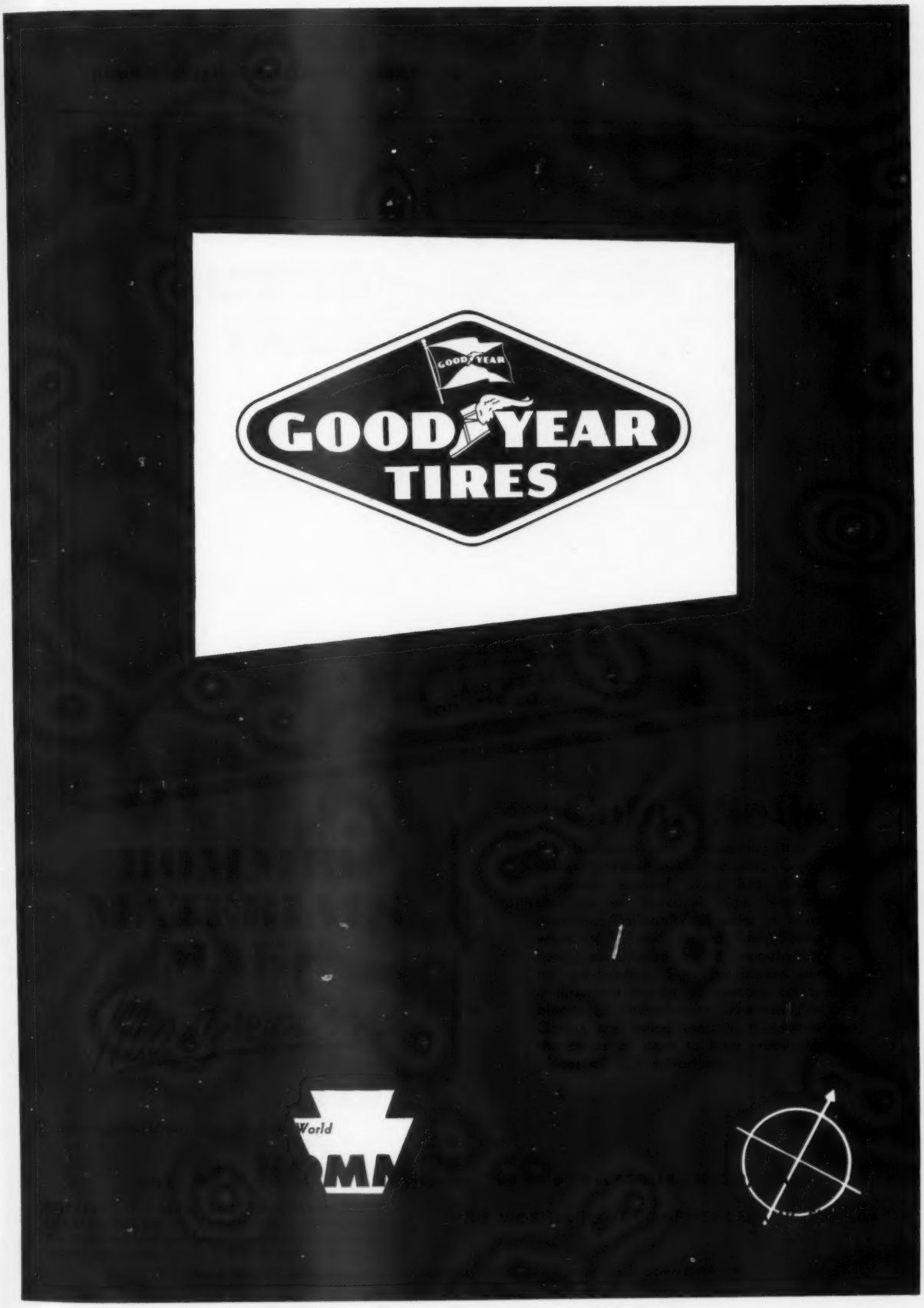
Basic Materials Exposition, International Amphitheatre, Chicago, May 17-20.

GAS APPLIANCE MFRS. MEETING

Gas Appliance Manufacturers Association, annual meeting, Drake Hotel, Chicago, May 19-21.

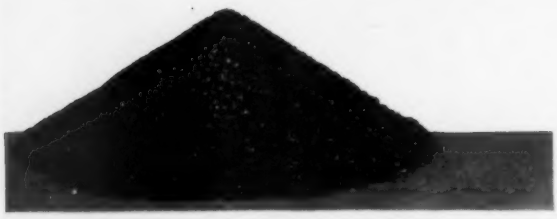
STEEL KITCHEN MFRS. MEETING

Steel Kitchen Cabinet Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va., May 27-29.


GOODYEAR
GOOD YEAR
TIRES
World

Try Century Vit

GROUND COAT



"Start right from the Steel out" is more than a slogan — it represents a policy and belief at Century that without an easy-working, trouble-free ground coat with good adherence or "Grip" no finish can give trouble-free service for the life of the product.

The millions of pounds of Century ground coat frit that are used every year by our customers give extra assurance of trouble-free finishes, both in the shop and on the finished product.

Century *time-proved* frits "put dollars in your pockets" too. They are priced right to start and there are "in plant" savings that count up fast.

If you haven't tried this economical, trouble-free enamel, contact us and we'll see that you have the opportunity.

An experienced field staff serves the plants of all Century customers. Phone POrtsmouth 7-7260.

FRIT from CENTURY
FRIT MASTERS

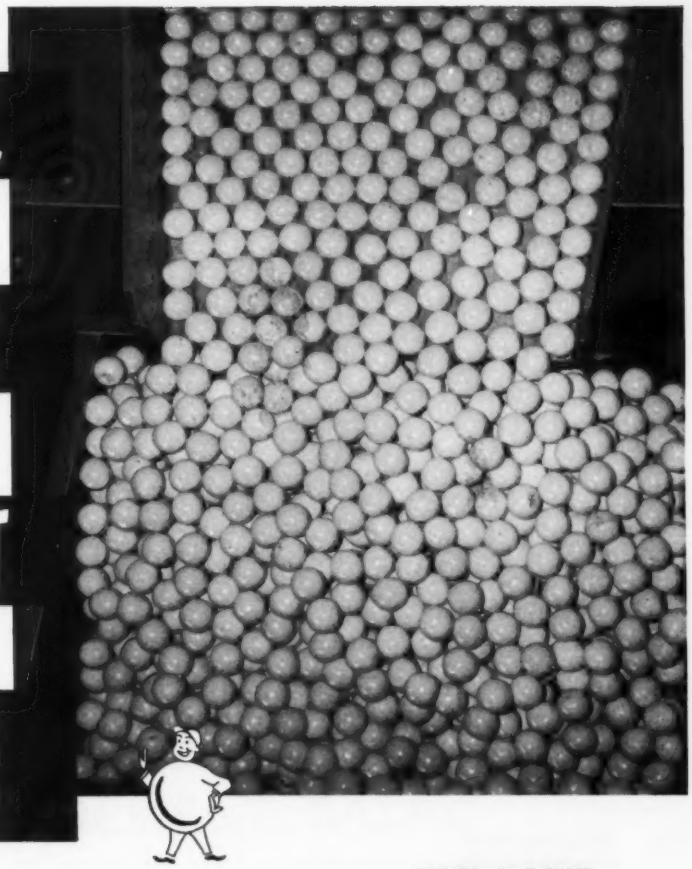
CENTURY VITREOUS ENAMEL COMPANY

• 6641-61 S. Narragansett Ave., Chicago 38, Ill. •

Easier on the **MILL**

Safer for the **MIX**

Lighter on the **COST**



McDANEL

35 years ago McDanel developed a vitreous porcelain of tough, stony structure for the making of grinding balls. The Balls made from that porcelain formula were immediately accepted by the Enamel industry — **became the standard!**

Each year of the past 35 has offered new proof of McDanel Balls resistance to impact . . . long and uniform wear . . . drastic lowering of grinding costs. McDanel Balls combine to produce pure, clean, uniform batches at tip-top speed and economy. Use McDanel for A-1, all-around value and service.

OTHER McDANEL PRODUCTS

MILL LINING BRICK
PORCELAIN OR HIGH DENSITY

SPECIAL SHAPES
TANK LININGS

MILL HEAD ASSEMBLIES

LABORATORY JAR MILLS

METAL COVERED
GRINDING JARS

ALL PORCELAIN
GRINDING JARS

PORCELAIN SPECIALTIES

Write today for catalog containing full data on McDanel Porcelain Products

Packed in 100 lb. sacks for your protection
Prompt shipment on all sizes

McDANEL Industrial PORCELAINS

McDANEL REFRACTORY PORCELAIN CO.
BEAVER FALLS, PENNA.

NORTHWEST

the answer to a search for A BETTER WAY!

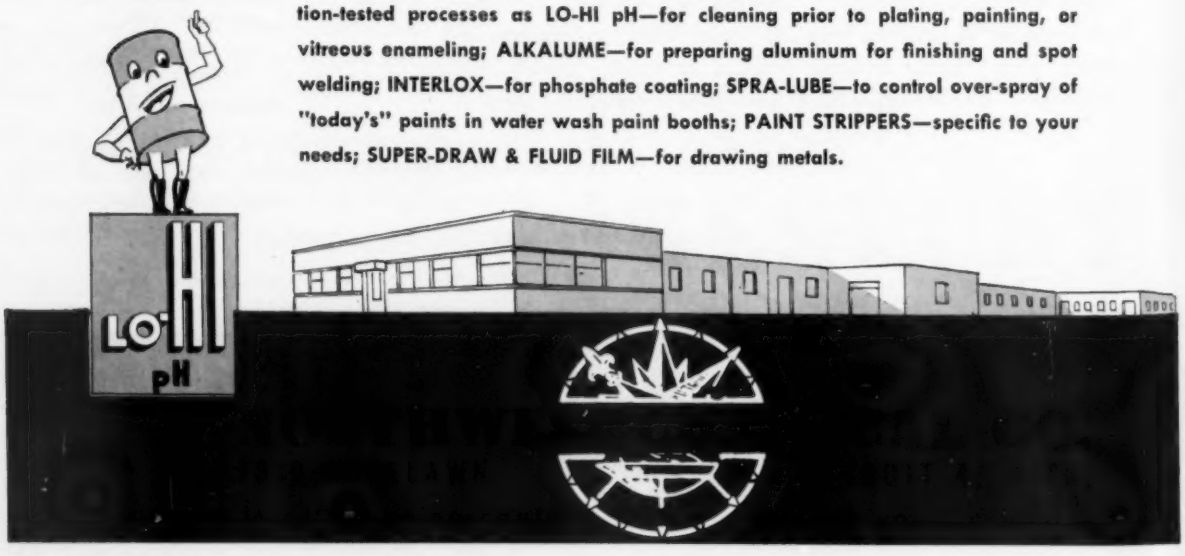
Mariner . . . Trapper . . . Woodsman . . . Pioneer . . . All seeking the elusive better way to cross the vast expanses that made up the New World. Searching with such determination to find a Northwest Passage that now the name *Northwest* has become symbolic of the *better way.*

Taking a leaf from history, Northwest Chemical's Cleaning Specialists carry on the constant exploration in the lab and in the field for better ways to solve the complex cleaning problems of modern industry.

As a result of this search for the better way, Northwest has developed such production-tested processes as LO-HI pH—for cleaning prior to plating, painting, or vitreous enameling; ALKALUME—for preparing aluminum for finishing and spot welding; INTERLOX—for phosphate coating; SPRA-LUBE—to control over-spray of "today's" paints in water wash paint booths; PAINT STRIPPERS—specific to your needs; SUPER-DRAW & FLUID FILM—for drawing metals.

Remember—YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER.

Northwest's production-tested chemicals and "Right the first time" recommendations will save you money. Northwest Service is as close as your phone.



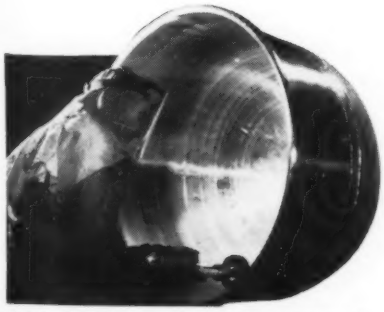
YOUR OWN KITCHEN HAS A CLUE TO PROFITABLE EQUIPMENT SALES

Here it is: Easy Cleaning

ENDURO Stainless Steel pots, pans and other equipment "come clean" with little effort. Usually a simple washing with soap and water restores that gleaming luster. Sometimes, a warm water rinse is enough.

Your customers, too, are vitally interested in cleaning such equipment as sinks, counters, tables, vats, kettles, containers, and countless other items which you can fabricate of ENDURO. You can tell customers that your ENDURO equipment is easy to clean, because it's solid stainless steel with no applied surface to peel, chip or crack. That it can take a beating and come up for more because it's tough and durable. That it resists dents, abrasion, rust and corrosion.

Fabricating ENDURO Stainless Steel can be a profitable business for you. The Republic Distributor in your area will be glad to help you get started with technical help and suggestions. Write for details.



Fabricating ENDURO Stainless Steel is easy with your present equipment. Republic will be glad to explain any slight changes in methods and procedures necessary to turn out high quality stainless equipment.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC ENDURO STAINLESS STEEL

Other Republic Products include Black, Galvanized, Galvannealed and Electro Paintlok Sheets — Toncan Iron Sheets — Bolts and Nuts — Tubing

HERE'S HOW The WEAN Can Save You 20%

And

Here's A Simple Test That May Startle You

Want to save 20 percent on your steel costs? If you are using sheet steel in any great amounts a Wean Equipment engineer can quickly show you how the amazing new Wean Slitting and Flying Shear Line can effect this savings in your plant. Using your actual figures, Wean can, by a simple comparison method, quickly prove to you that these savings are possible. Why continue operating at high costs when this improved method could be saving you as much as $20 a ton on your steel?

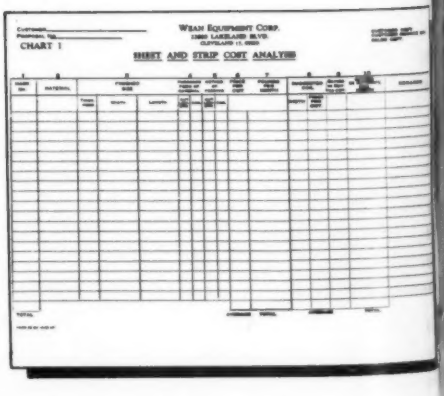


CHART 1

WEAN EQUIPMENT CORP.

SHEET AND STRIP COST ANALYSIS

A Slitting and Flying Shear Line 9 On Your Steel Costs

The secret of these tremendous savings is a short cut in getting steel from coil form to fabrication. If you are not one of those already using the Wean Slitting and Flying Shear Line you are either paying mill extras for shearing to tolerance and size or are forced to do this operation expensively and slowly in your own plant or a costly combination of both.

The Wean Slitting and Flying Shear System eliminates this entire processing function by converting steel from coil to production size, at resquared tolerances, at a rate of 100 cuts per minute.

Just figure it out for yourself. Apply these figures to your own operation. Total up the extras you are now paying for steel preparation and you'll see why it will pay you to talk with Wean.

Wean

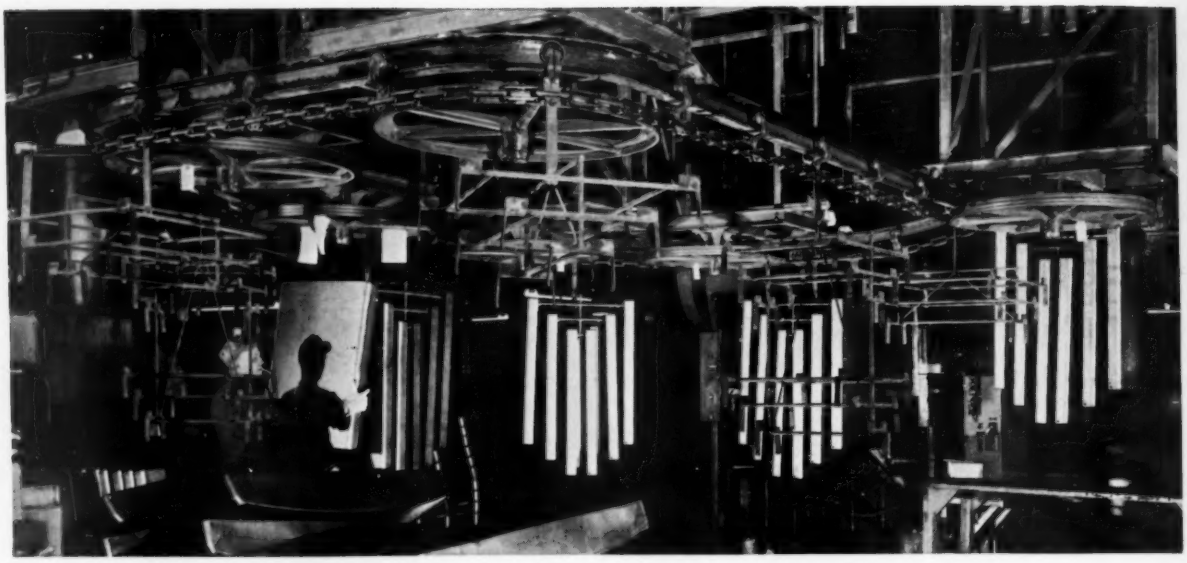
COMBINATION SLITTING and SHEARING SYSTEMS

WEAN EQUIPMENT CORPORATION OFFICES

Cleveland

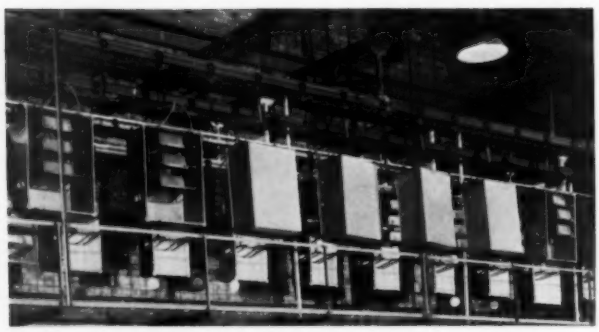
Chicago Newark N. J. Detroit

Cable Address: Weancor

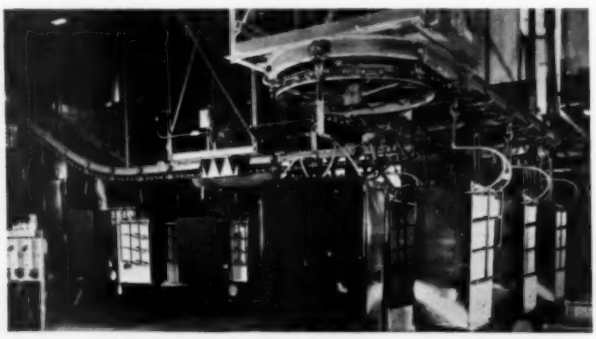


8500-ft. Link-Belt conveyor holds 1350 hangers, with six doors to a hanger. Doors are stored overhead, and photograph shows workman unloading them as they come down from storage.

Overhead conveying-storage smooths refrigerator production



From stamping to cleaning to enameling to storage—1150-ft. Link-Belt overhead trolley conveyor (above) carries vegetable crispers and interior liners through all four stages. Below: Interior liners are carried from enameling to assembly line by this 1360-ft. Link-Belt overhead trolley conveyor.



Versatile LINK-BELT overhead trolley conveyors use ceilings, save floor space

MAKING refrigerators formerly required plants of unusually large floor area. But when this new Chicago plant was built, the ceilings were put to work.

Three Link-Belt overhead trolley conveyors move through various stages of live storage, transport and production. They travel around obstructions . . . remain high in the air where headroom is required . . . dip floorward to bring the load down to working level.

If you require smooth, steady, straight-line production in your plant, get in touch with your nearby Link-Belt specialist in this type of conveying. Whether your production is in one building or several . . . single or multi-floor—he'll show you how Link-Belt overhead trolley conveyors can cut your handling costs.

LINK-BELT

OVERHEAD TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,524

finish SUGGESTION BOX

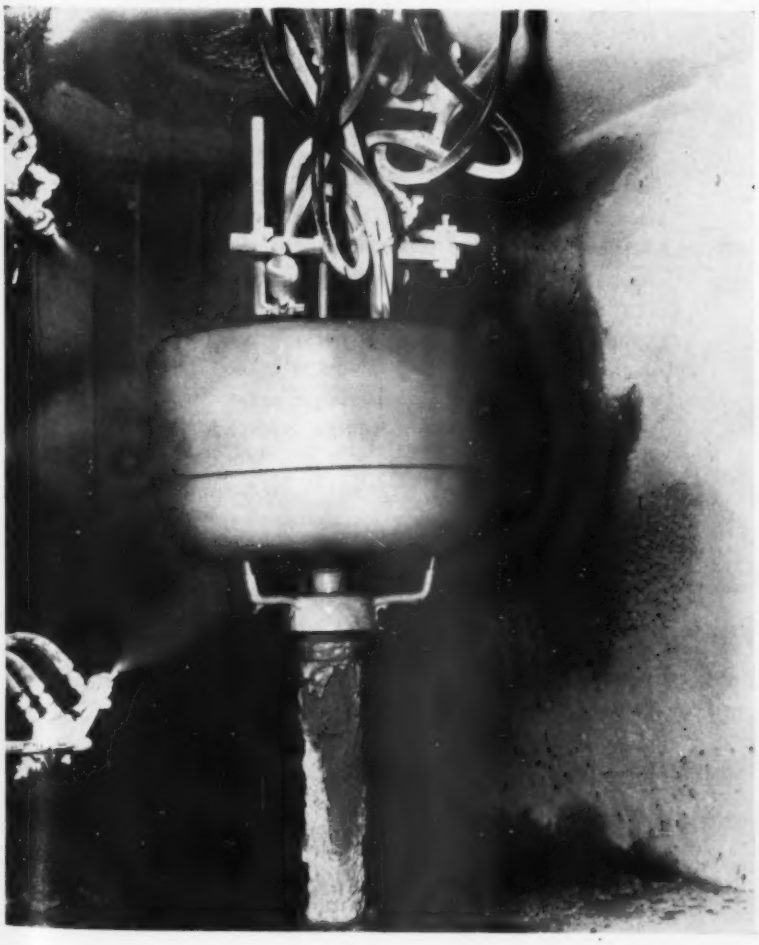
New automatic machine sprays 250 washer tubs per hour

A NEW automatically-operated machine, designed to save labor and handling costs, is able to spray up to 250 washing machine tubs per hour. It is said to be the first automatic spray machine in industry that can successfully apply porcelain enamel slip to washing machine tubs.

It is now being used at Alliance Ware, Inc. and Heintz Manufacturing Co., and another installation at The Maytag Company will be in operation shortly, according to the report.

Dishwashers, bathtubs too

The announcement further stated that equipment for automatically flow coating dishwasher tubs has already been designed, and plans for automatically spraying bathtubs are under way.



Source for more information on this new machine may be obtained by writing to *finish*.

WESTINGHOUSE SALES UP, EXPECT 15% INCREASE IN '54

Sales of Westinghouse electric appliances were up 5% in January and February over the same period last year, according to John H. Ashbaugh, vice president, Westinghouse Electric Appliance Division.

Ashbaugh predicted that should business conditions remain the same throughout the year, sales of Westinghouse appliances during 1954 are expected to be 15% greater than in 1953.

NORGE SHIPMENTS RISE SHARPLY IN FIRST QUARTER

First quarter factory shipments of refrigerators were up 77% and dealer shipments up 20% over the same period last year, it was reported by the Norge Division of Borg Warner Corp. Automatic washer factory shipments were up 57% and dealer shipments up 68%.

EKCO FIRST QUARTER SALES RISE 21% OVER LAST YEAR

First quarter sales of Ekco Products Co. totalled an estimated $15,300,000, or 21% more than in the same period last year, reported Arthur Keating, chairman, at Ekco's annual stockholders meeting.

APPLIANCE EXCISE TAX REDUCTION RESULT OF TRADE ASSOCIATION WORK

Reduction in Federal excise taxes from 10% to 5% on home appliances became effective April 1, with the passage and signing of H.R.8224, the excise tax bill.

Credit for the reduction goes to the appliance industry's trade associations which have been working for years toward the goal of repeal of all excise taxes on home appliances.

The tax reduction applies to most household appliances. Exceptions include room air conditioners, radios and television sets.

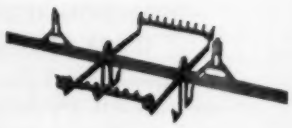
THERE'S HEAT THERE'S FAHRALLOY

WHERE THERE'S HEAT THERE'S FAHRALLOY WHERE THERE'S HEAT THERE'S FAHRALLOY WHERE THERE'S HEAT THERE'S

FAHRALLOY...

BURNING TOOLS

No. 1 Choice of the Porcelain Enamel Industry



There's always good reason why one product forges ahead to leadership in its field. Product performance, more than any other one factor, is largely responsible for this success. It is product performance which has made Fahralloy burning tools the No. 1 choice of the porcelain enamel industry . . . product performance for over 20 years. When Fahralloy alloys chrome, nickel and other metals to cast burning tools the specific service conditions which the castings must meet are given full and careful consideration. Then the metallurgically correct composition is determined to assure longest possible life under those tough service conditions at the high temperatures involved. With such exacting standards, is it any wonder why porcelain enamelers just naturally turn to the leader . . . to Fahralloy for the answer to their burning tool problems? You'll find your answers at Fahralloy, too.

CLARE CHARRON • 509 Curtis Building • Trinity 5-7633
DETROIT Area Representative

THE FAHRALLOY CO.

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ESSAK METAL CLEANERS

GIVE YOU

highest quality products

You get what you pay for and then some in ESSAK metal cleaners. You get cleaners that are chemically compounded from the finest raw materials available. You get uniformity of product that assures you of uniformity in your metal cleaning operations. Any experienced production man knows how important this is from a standpoint of finished product quality as well as costs.

performance

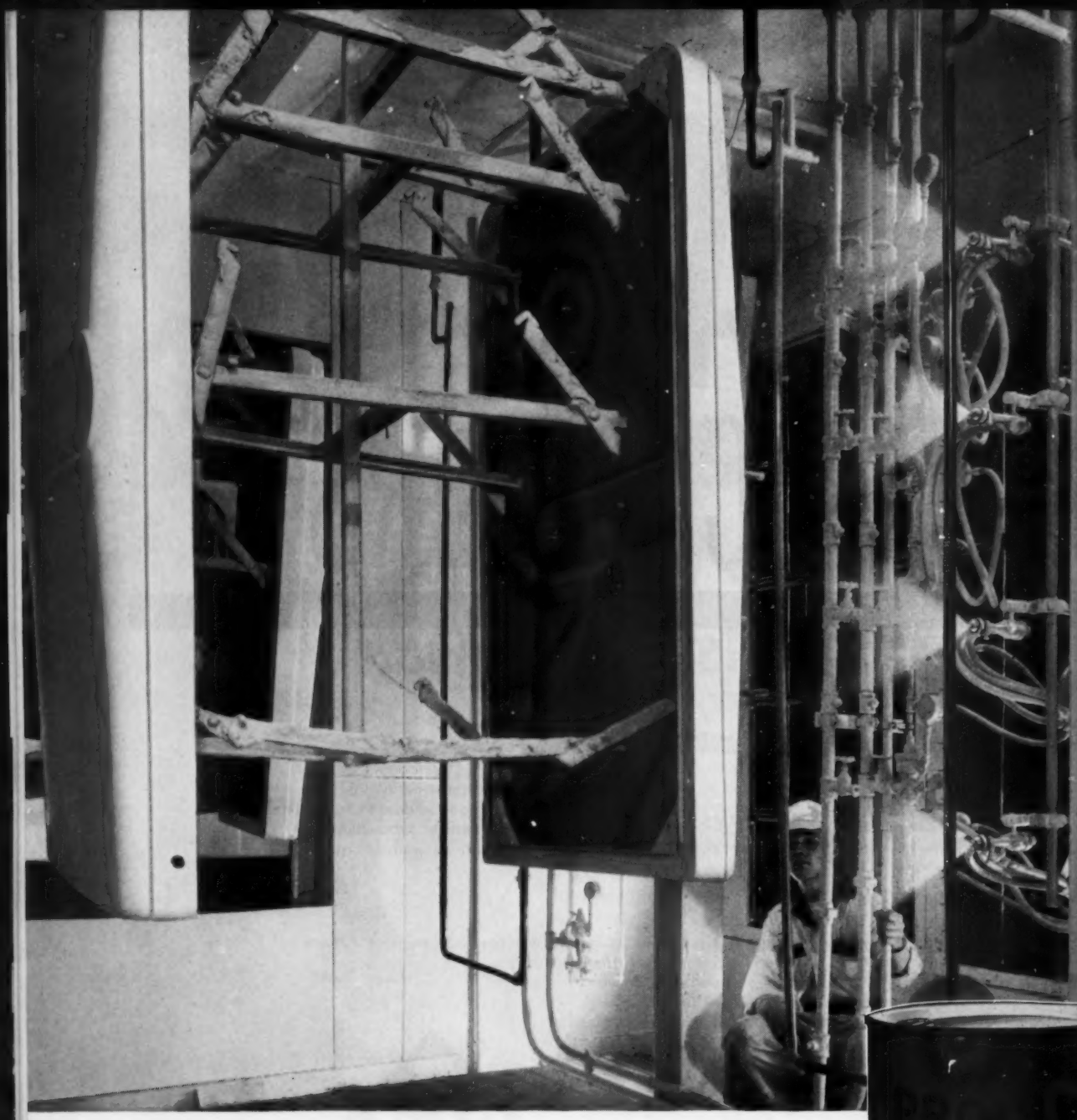
The important question about any metal cleaner is "Is it right for the job?" ESSAK metal cleaners prove in performance that they are chemically compounded to be most effective for the purpose for which your ESSAK engineer recommends them. Try them — and judge the results for yourself.

service

ESSAK as an organization works on the premise that service is the backbone of sales. ESSAK service starts with a recommendation based on your individual need. It follows through to assure you of effective cleaning operations. It never ends.

THIS LABEL IS YOUR GUARANTEE OF UNIFORM PRODUCT QUALITY IN METAL CLEANERS

ESSAK
STEEL & CHEMICAL CO.
METAL CLEANERS
4013 MILWAUKEE AVENUE CHICAGO 41, ILLINOIS



FASTER FINISHING FOR FAMOUS FREEZER

The completion of a new automatic finishing line at Amana Refrigeration Inc., has given this pioneer builder of upright freezers many finishing advantages.

The switch-over to an electrostatic spraying system speeded production, reduced rejects and eliminated several costly finishing problems.

Many of the recommendations which have proved so successful were made by Glidden Technical Service men. This is consistent with the type of start-to-finish help G. T. S. provides in improving finishing procedures, increasing product quality and lowering finishing costs. Call on Glidden *first* for all your finishing needs.

THE GLIDDEN COMPANY

INDUSTRIAL FINISHES DIVISION

11005 Madison Avenue • Cleveland 2, Ohio

SALES OFFICES AND FACTORIES: San Francisco, Los Angeles, Chicago (Nubian Division—1855 North Leclaire Avenue), Minneapolis, New Orleans, St. Louis, Cleveland, Reading, Atlanta and Toronto.

THE finish spotlight

The "Stow-A-Way" is a new development in undercarriages for Thor clothes washers which makes the laundry appliances mobile, allowing the homemaker to roll them away into any storage space when not in use. The new undercarriage, which does not alter the level of the machines, is operated by a handle using the lever principle, which raises or lowers either rubber based legs, for sturdy operation, or ball-bearing casters for easy movability.

CHEMICALS ACP PROCESSES

PHOSPHATE COATINGS TO MAKE YOUR PRODUCT DURABLE*

PIONEERING RESEARCH AND DEVELOPMENT SINCE 1914

For more than a third of a century, ACP research chemists and ACP technical representatives in the field have pioneered in the science of metal preservation. They have developed surface treating chemicals which either protect metals directly, or create a superior bond for decorative and protective paint finishes, and now, ACP chemicals and processes are being used the world around to reduce costs, speed production and add to the life-span of countless products.

ACP metal protective chemicals include: protective coating chemicals for steel, zinc and aluminum; metal cleaners and rust removers; final rinse controls; pickling acid inhibitors; copper coating chemicals; soldering fluxes; alkali cleaners and addition agents; copper stripping and brightening solutions.

PAINT BONDING

"GRANODINE"® zinc phosphate coatings improve paint adhesion on automobiles, refrigerators, projectiles, rockets, and many other steel and iron fabricated units or components.

"LITHOFORM"® zinc phosphate coatings, make paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE"® protective coatings provide improved paint adhesion and high corrosion-resistance for aircraft and aircraft parts, awnings, wall tile, signs, bazookas, and many other products made of aluminum.

RUST PROOFING

"PERMADINE"® zinc phosphate coatings provide rust and corrosion proofing for nuts, bolts, screws, hardware, tools, guns, cartridge clips, and many other industrial and ordnance items.

PROTECTION FOR FRICTION SURFACES

"THERMOIL GRANODINE"® manganese-iron phosphate coatings provide both rust proofing and wear resistance — anti-galling, safe break-in, friction on rubbing parts.

IMPROVED DRAWING AND COLD FORMING

"GRANODRAW"® zinc phosphate coatings make possible improved drawing, cold forming and extrusion on such steel products as sheets for stamping, bumpers, parts to be formed, prior to plating or painting, cartridge cases, etc.

**Made, Sold, and Serviced By A Pioneer In Protective Coatings For Metals . . .*

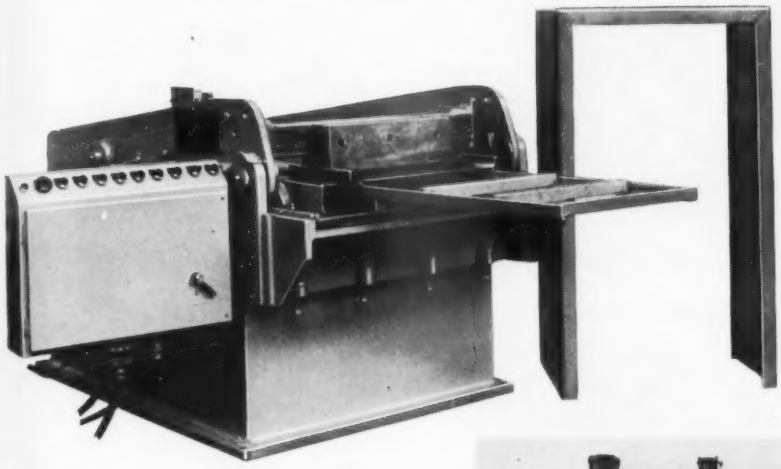
AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Detroit, Michigan ***Niles, California*** ***Windsor, Ontario***

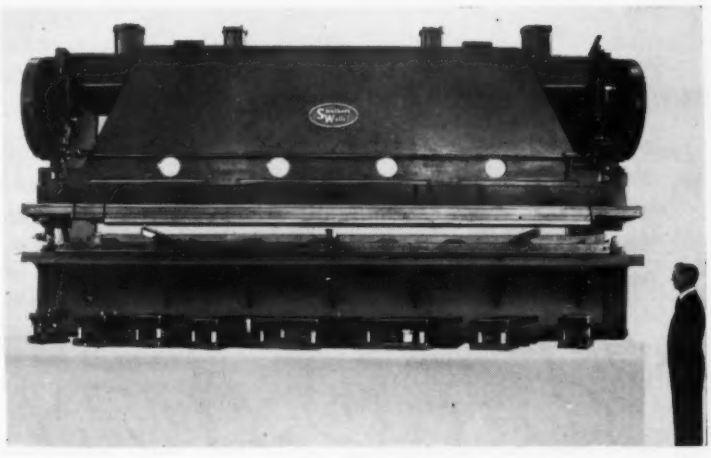
JORDON cuts production costs with STRUTHERS WELLS EQUIPMENT

. . . produces this upright Freezer Shell from flat sheet sheared to size



in just 4 operations

Struthers Wells plays a vital part in building the popular JORDON Upright Freezer. The special Press Brake with wide bed area is supplied with complete tooling, and processes flat, sheared-to-size sheet in three operations. No. 1—notches, and pierces all holes; No. 2—flanges on all sides formed with box-type die; No. 3—forms front deep radius bend. No. 4, with Single Wing Tangent Bender bonds preformed and processed sheet into U-shaped shell ready for assembly. Rapid, economical production is maintained for Jordon by this modern Struthers Wells equipment.



Struthers Wells

Machinery Division

STRUTHERS WELLS CORPORATION

TITUSVILLE, PA. Offices in Principal Cities

Order cold-rolled sheets and strip from our new, modern continuous mill

Continuous pickling line at our new cold-rolled mill, Indiana Harbor Works, East Chicago, Indiana.

●Orders are being booked now for third-quarter shipment of cold-rolled sheets and strip from our new continuous mill at East Chicago. Let us know promptly what you need, so that we can take care of your requirements, arranging delivery to meet your manufacturing schedules. Write or phone our nearest District Sales Office.

Youngstown

QUALITY V YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

History of Westinghouse appliance division

from thousands of dollars in sales in 1918 to hundreds of millions today

THOUSANDS of automatic electric appliances are turned out daily in the plants that make up the Westinghouse Electric Appliance Division. These products range from large two-door refrigerators to steam irons.

The Electric Appliance Division, headquartered in Mansfield, Ohio, is one of 23 divisions of the company which operate a total of 51 plants. The Appliance Division is composed of four plants:

The East Springfield, Mass., plant produces such products as refrigeration units, water and beverage coolers, fans, vacuum cleaners, food mixers and food waste disposers.

The Mansfield, Ohio, factory turns out electric ranges, washing machines, clothes dryers, refrigerators and home freezers, dishwashers, water heaters and electric housewares.

The Columbus, Ohio, plant builds refrigeration products (more products to come).

The Newark, Ohio, plant stocks all renewal parts for the Electric Appliance Division products.

In the early 1900's, the company's appliances consisted of approximately 10 table appliance items which were made in plants located in East Pittsburgh, Pa., and Newark, N.J. Westinghouse appliance sales were then the responsibility of the Apparatus Supply Department—a highly-trained technical engineer would sell transformers and switchboards one day and flat irons and fans the next.

First civilian products manufactured at the East Springfield plant were washing machine and other small motors, automotive equipment (starters and generators) and fans, in 1919. From a small building the plant today has grown to 1,300,000 square feet of floor space.

Electric range development

In 1917, Westinghouse purchased the Copeman Electric Stove Co., in Flint, Michigan, and began the development and production of a fully automatic electric range. Simultaneously, all company appliances became the responsibility of the Merchandising Division.

In March, 1918, the Merchandising Division was moved to Mansfield, pulling together operations carried on at Flint, East Pittsburgh and Newark.

From "thousands" to "millions"

Mansfield opened operations with approximately 100 people on the payroll and with 100,000 square feet of floor space. Sales billed in 1918 were counted in the thousands of dollars. Today, the Mansfield plant covers 1,900,000 square feet and yearly sales total hundreds of millions of dollars.

In 1923, the name Westinghouse Electric Products Company was changed to Westinghouse Electric and Manufacturing Company. The present name — Westinghouse Electric Corporation — was adopted in 1942 when, at the same time, the Merchandising Division became the Electric Appliance Division.

The company produced its first *automatic* electric iron in 1924. In the 1930's refrigerators, water heaters, vacuum cleaners, roaster ovens and dishwashers were added to the line. Laundromat automatic washers were marketed in 1940, making a total of 23 appliances produced by the company.

With the outbreak of World War II, the company's appliance plants turned to the manufacture of precision instruments such as binoculars, bomb fuses, tank gun stabilizers, radio transmitters, and depth controls as well as fabricated airplane parts.

Post war expansion for 50% production increase

Shortly after V-E Day, the Electric Appliance Division embarked on an $11,500,000 expansion program that brought its overall production level 50 per cent higher than prewar. It also made possible the manufacture of new postwar products by the Mansfield and East Springfield plants.

In 1946, Westinghouse introduced its first upright home freezer. Other new products added to the lines included: automatic clothes dryers, food waste disposers, electric bed coverings, electric griddles, waffle baker and sandwich grille combinations, steam irons, open handle dry irons and additions to the vacuum cleaner line. In 1949 came the first fully automatic defrosting refrigerator.

In 1952 "cooking without looking" was ushered in on range with an automatic surface unit. Shortly thereafter Cook-N-Fryers, dehumidifiers and room air conditioners were added to the lines.

In the meantime a renewal parts service depot had been established in Newark, Ohio, to service all home appliances. This plant has 115,000 square feet of floor space devoted to parts storage and 20,000 feet to manufacturing. More than 14,000 styles of renewal parts are stored and shipped to distributors with approximately 2500 orders a day being filled.

Second expansion wave — the Columbus plant

A second wave of postwar expansion for the Appliance Division was initiated with the decision to build

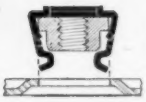
to Page 110 →

for story on new plant, see page 26

New, Self-Anchoring SPEED GRIP®
cuts assembly costs in half!

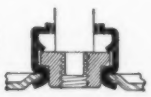
Whatever your present method of attaching square nuts to panels, new self-anchoring SPEED GRIPS can do the job faster, easier, better. This unique fastener has spring steel "mechanical hands" that permanently lock the nut in bolt-receiving position. It cannot be dislodged even with rough handling. Applied after painting or porcelainizing, there is no clogging, retapping or masking of threads to bother about. *And* it is ideal for blind location attachments.

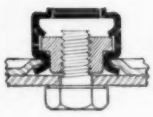
Total up the savings in application time—in expensive assembly equipment—in handling time—in assembly steps—and you'll switch to self-anchoring SPEED GRIPS—the newest addition to the complete Tinnerman line of Nut Retainers.



Set self-anchoring SPEED GRIP in panel mounting hole.

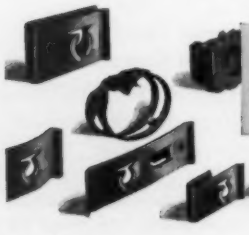
Simple tool presses nut into locked position.





Heavy duty nut in locked position — permanently retained — can't rotate, rattle or be dislodged.

Write today for free copy of new detailed SPEED GRIP Bulletin, No. 335. Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S.A., 7 rue Henri Barbusse, Levallois (Seine).



TINNERMAN *Speed Nuts*®

MORE THAN 8000 SHAPES AND SIZES

Designed for timid souls who shy away from complicated controls—

NEW LUX "OVEN-MINDER"

We're telling the "Oven-Minder" story to the millions of readers of: *Better Homes & Gardens, Ladies' Home Journal, Today's Woman, Living for Young Homemakers, House Beautiful* and *Good Housekeeping.*

Simplest ever developed for Automatic Cooking!

HOW LONG

Nothing new to learn! Nothing new to do! All she does is set the Minute Minder for the cooking time required and the temperature for the heat required. Her dinner is now cooking and will turn off *automatically!*

HOW HOT

If she wants her cooking to start later, all she does is turn this knob to the starting time—just as simple as setting an alarm clock!

DELAYED START

When time's up, she's reminded with the exclusive

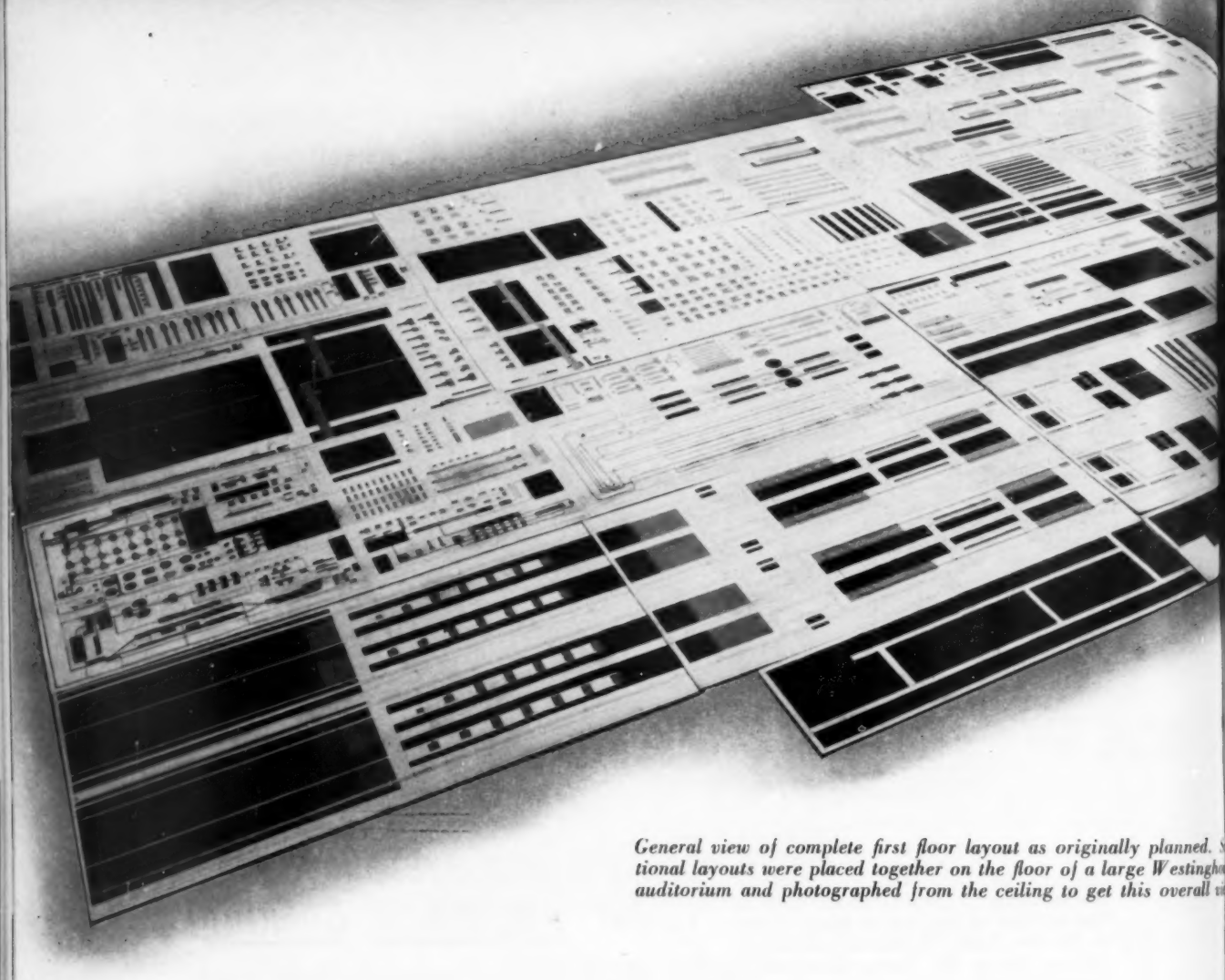
LUX BELL-CHIME SIGNAL

And, what's more, the Minute Minder can be used for timing a hundred other household chores!

No wonder range-makers are adding new sales appeal to their lines with the exclusive LUX "Oven-Minder."

Write Lux today for complete details!

THE LUX CLOCK MANUFACTURING COMPANY • WATERBURY 20, CONNECTICUT



General view of complete first floor layout as originally planned. S
tional layouts were placed together on the floor of a large Westingho
auditorium and photographed from the ceiling to get this overall v

New Westinghouse $45 million appliance plan

Columbus, Ohio, plant is fifty-first Westinghouse manufacturing facility — 1500 employees will grow to 6000 — plant to have production capacity of 4000 major appliances per day

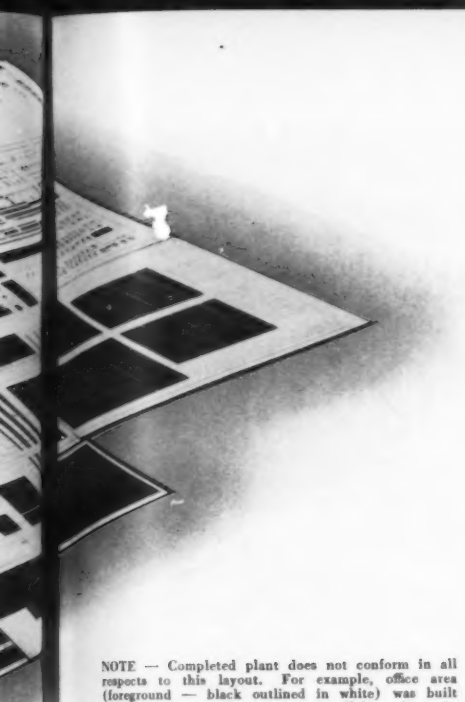
(this first article of a series features sheet metal fabrication)

THE new Westinghouse appliance plant at Columbus, Ohio, is now in production and it is expected that the current production rate of 800 domestic refrigerators per day will increase steadily until the end of 1954. Ultimate capacity of the plant when completely equipped and in full operation is rated at 4,000 major appliances per day.

Although the new Columbus plant is not the largest of the 51 plants which the company operates, it is the largest that has been *built* by Westinghouse. Its size, representing over 2,000,000 sq. ft. of floor space, is certainly sufficient to impress the industrial publication editor who has the interest, and stamina, to search into its four corners for technical and plant operation information.

From the steel storage department, served by its ten-ton cranes, to the packaged product warehouse, with capacity for 100,000 appliances, conveyors and other materials handling equipment are used to the ultimate. Twenty-seven miles of overhead and floor type conveyors in the plant are split into 51 different systems. Operations have been automatized wherever possible.

Unusually high ceiling levels (from 30′6″ to 40′0″) combined with excellent lighting facilities make for excellent working conditions for



NOTE — Completed plant does not conform in all respects to this layout. For example, office area (foreground — black outlined in white) was built in the form of a T instead of parallel to the main building as shown here.

the 1500 workers now employed, a number which is expected to rise to 6,000 as production expands.

Materials and process inspection stressed

All incoming steel is inspected for alloy content, size, tensile strength, hardness and surface conditions before it is used. During shearing, stamping, forming, punching, and drilling operations — inspection for size, depth of emboss, width and squareness of flanges, size and location of various holes, absence of die marks, burrs, dinges, and scratches are made on the first piece plus periodic patrol piece inspection.

This same inspection pattern is followed for welding and sub-assembly operations. It extends to surface finishing, degreasing, rust inhibiting, porcelain enameling, and exterior organic finishing. *(These processes to be covered in later articles)* Dimensional tolerance checks are made after every manufacturing and fabrication operation to insure close fit.

The starting point for this description of sheet metal fabricating operations is in the steel storage and shear and press shop area. At this point sheet steel for the outer shell, the inner liner, the door, the many small parts, and electrical sheet steel for the compressor motor are re-

to Page 30 →

FACTS ABOUT THE NEW WESTINGHOUSE PLANT

Gross area — is 2,056,981 sq. ft., including 1,885,263 sq. ft. of manufacturing area.

Overall dimensions — plant is 2172 ft. x 882 ft., while office is 480 ft. x 200 ft.

Plant height — from the floor to roof steel is 30 ft. 6 in.; in high bay area it is 40 ft.

High bay area section — used for steel storage has 100-foot spans served by 10-ton bridge cranes.

Second floor area — totals 383,000 sq. ft.; mezzanine area totals 17,200 sq. ft.

Air compressors — three 2500 cfm steam-driven units; one 1000 cfm motor-driven unit.

Air conditioning — office, 300-ton; cafeteria, 100-ton, auditorium, 100-ton.

Power distribution — 19 of 22 power centers are connected in three separate low voltage network loops composed of two loops with six centers and one loop with seven centers. Bus duct is used throughout the manufacturing area.

Lighting — 40 different types of indoor and outdoor lighting fixtures are used throughout the plant, with 400-watt and 1000-watt fluorescent mercury lamps used in the high bay areas. In the offices and low bay areas, fluorescent lamps are used. Office and working areas — 50-foot candles; non-work areas 15-foot candles. Plant lighting requires over 25,000 lights — 10,000 fluorescent, 3,500 mercury arc.

Shipping — 6 miles of railroad siding serve plant at eight points; 49 freight cars can be loaded inside the plant at one time. Also serving the plant are 41 indoor truck docks, each with automatic leveler for varying truck sizes. At maximum plant capacity, 60 carloads of raw materials will be shipped in *per day*, and 90 carloads of finished appliances will roll out.

Handling — 51 conveyor systems totalling 27 miles. 65 lift trucks are used throughout the plant, chiefly in warehousing. Fork lift trucks are designed to carry two crated refrigerators simultaneously. There are also 18 electric walking pallet trucks. Warehous capacity is 100,000 major appliances.

Production — 2613 production tools are employed. First refrigerator was produced November 12, 1953. Current production rate is 800 a day. At present schedule, plant should be 100% in operation by the end of 1954. Ultimate capacity is 4,000 major appliances per day.

Employment — Current nucleus of 1500 employees. Eventual employment will be between 6,000 and 7,000 people.

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METAL STAMPINGS
THINK OF G. P. & F.
15 ACRES OF PRODUCTION FACILITIES • OVER 1000 SKILLED PEOPLE

You can end production headaches, increase manufacturing profits, and sell quality-built products, by using G. P. & F.'s complete fabricating and finishing service. Scores of America's leading firms use and recommend our service for hundreds of highly diversified items—including everything from parts for automobiles to home appliances—or from coin-operated dispensers to office equipment.

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ALL UNDER ONE ROOF - - - - - Not only do we relieve you of production details and responsibilities, but we also increase your profits by reducing shipping time and transportation costs on your contracted parts. All work is done under one roof in our centrally located Milwaukee plant. And, if you wish, we can package your products, and ship directly to your customers!

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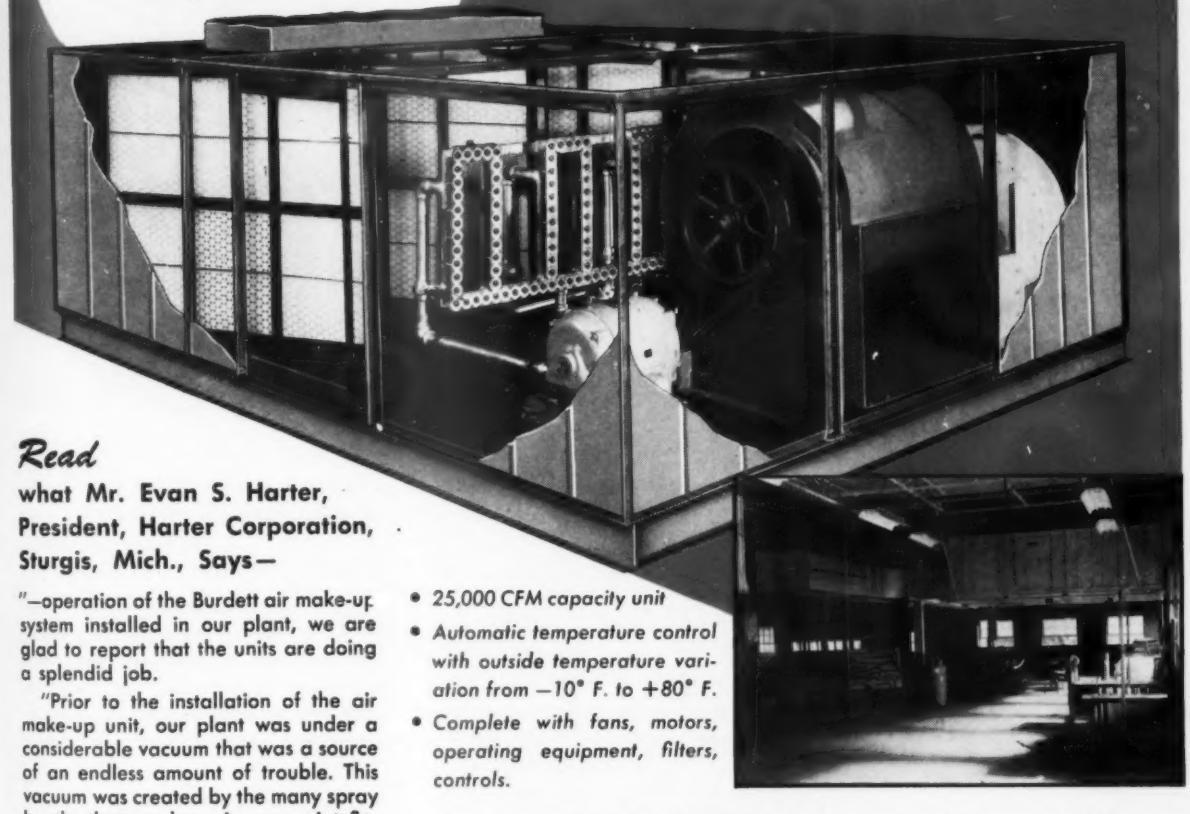
Why Operate in a Costly Vacuum?

When a BURDETT AIR MAKE-UP SYSTEM

—will eliminate this problem and increase efficiency of men and equipment



Read

what Mr. Evan S. Harter, President, Harter Corporation, Sturgis, Mich., Says—

"—operation of the Burdett air make-up system installed in our plant, we are glad to report that the units are doing a splendid job.

"Prior to the installation of the air make-up unit, our plant was under a considerable vacuum that was a source of an endless amount of trouble. This vacuum was created by the many spray booths that we have in our paint finishing department and also by the exhaust system employed in the grinding and buffing department, as well as other exhaust provisions for welding booths, etc.

"By the installation of these air-make-up units we are now able to satisfy air replacement requirements in any portion of our plant without affecting other areas or operations. The reason we chose to install several units of different capacities was so that we could satisfy our exact exhaust requirements regardless of the amount of equipment that was in operation.

- *25,000 CFM capacity unit*
- *Automatic temperature control with outside temperature variation from —10° F. to +80° F.*
- *Complete with fans, motors, operating equipment, filters, controls.*

"Since the installation of these air make-up units:

1. All exhaust systems are functioning satisfactorily and efficiently.
2. The spray booths and polishing lathes are working more efficiently because of sufficient volume of air in the building.
3. The lack of vacuum in the building has made it possible for people to work in comfort and without draft along windows and walls.
4. Doors of the building can be opened and closed by employees or automatic door openers without danger to employees or the necessity of frequent repairs of doors or door frames.
5. We have been able to maintain an even distribution of dampness in the different areas that were previously affected.

"The air make-up units have supplied the proper volume of fresh and heated air to the closely controlled temperature necessary to maintain the operation in each phase of production."

(Signed) Evan S. Harter
President

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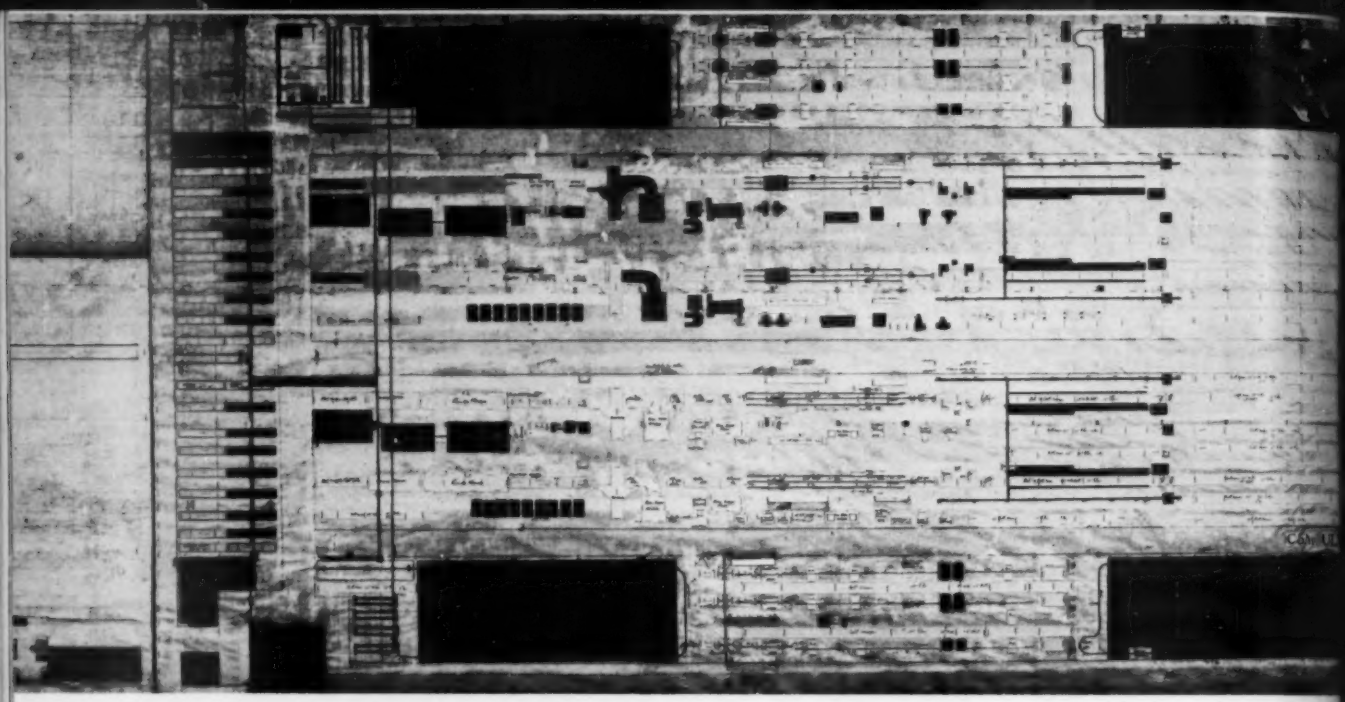


This photo of a small section of the plant layout shows the location of shell, outer door and panel fabrication. Horizontal black strips (left) show delivery and storage of wrapper sheet stock. Four large black areas represent storage of major parts before and after welding. Top center section (left to right) shows fabricating lines, including notching, forming (tangent bender), hydromatic welding, portable gun welding, and metal finishing (horizontal black lines). Gray area at right houses conveyors for delivery and storage. Center gray section (top) has same set-up for outer doors and lower panels. (Complete lower half of photo is duplicate of upper half as described.)

→ *from Page 27*

ceived, inspected, and released to the manufacturing operations.

Many automatic machines used

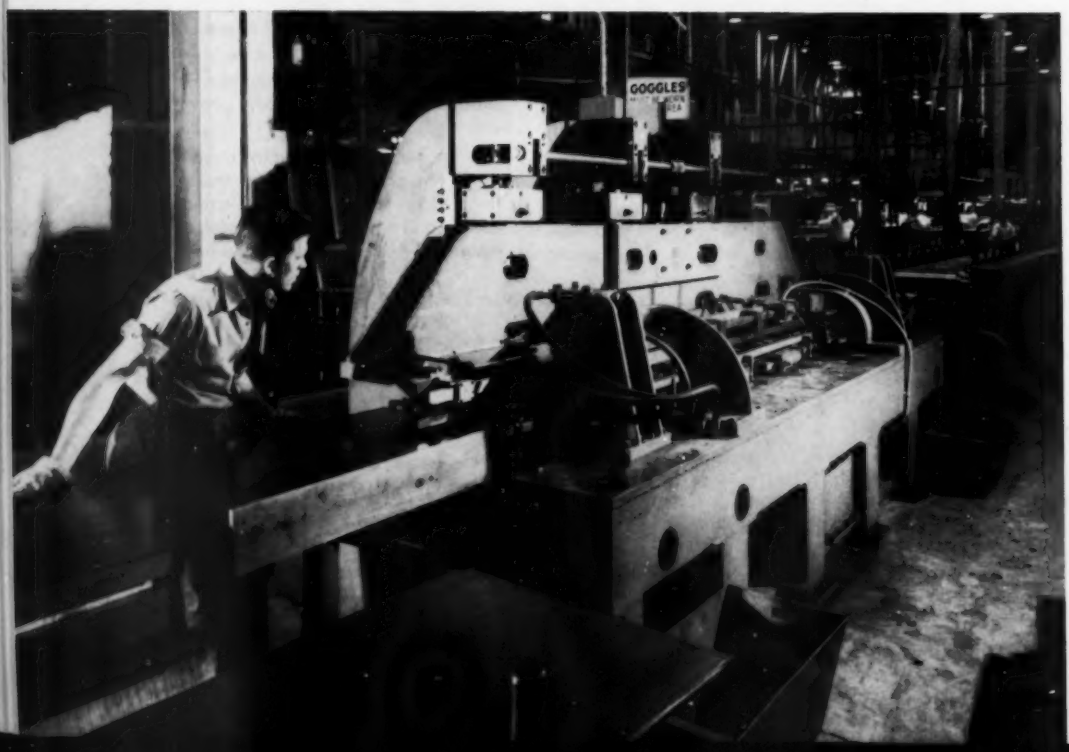
From here on machines do many things: stamp out 500 compressor motor laminations a minute; draw, form, trim, and notch structural sheet into hundreds of small, intricate parts; blank sides, top and bottom of the door frame which are then joined together by welding; form the refrigerator door, then trim and pierce.

Sixty-five electric lift trucks and 18 electric walking trucks are available throughout the plant for materials handling. From the press shop, all fabricated small parts are moved by pallet to the production line.

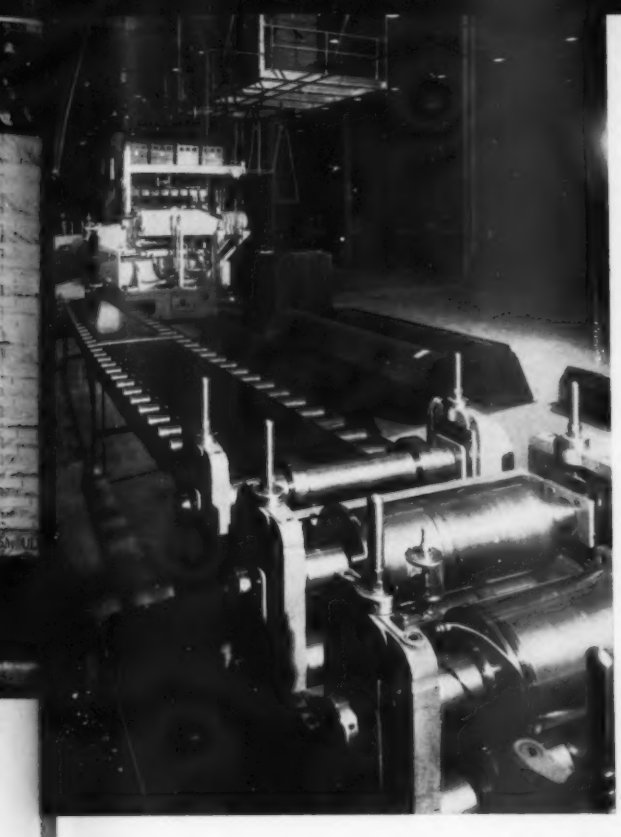
Sub-assemblies, such as the welded refrigerator door and door frame, are moved to the shell and door fabrication and metal finish section by overhead conveyor.

Cabinet fabrication

Equipment for fabricating the outer shell for the refrigerator is set up for straight line operation. The shell starts out as a single, flat sheet of steel that is wide enough to provide the depth of the model in production (with provision for flange rolling) and long enough to form a complete



1. The outside of a refri tor cabinet starts here flat sheet of steel. This is first notched and pierc this machine. It is flanged on what will b front and back edges. Th done on the machine i right background.



2. *As the flanged sheet leaves the rolling equipment, it is delivered by roller conveyor to the tangent bender and welding equipment in the background of this photo.*

3. *The tangent bender (foreground) is forming the cabinet wraparound. The back sheets, back brace, and reinforcing angles are then welded to the shell in an adjacent welder (left background). Ninety welds are performed simultaneously.*

wraparound unit. These sheets range from 25½ inches wide by 121¾ inches long to 25½ inches wide by 160⅛ inches long.

The first production step when making the outer shell is to notch and pierce the sheet. There follows in quick succession: flange rolling; sheet bending to form the sides and top of the shell; welding the back, backbrace, and reinforcing angles to the shell.

As the sheet leaves the first fabricating equipment it flows in a straight line to the flange rolling equipment. A roller conveyor then carries the flanged sheet to the tangent bender for shaping.

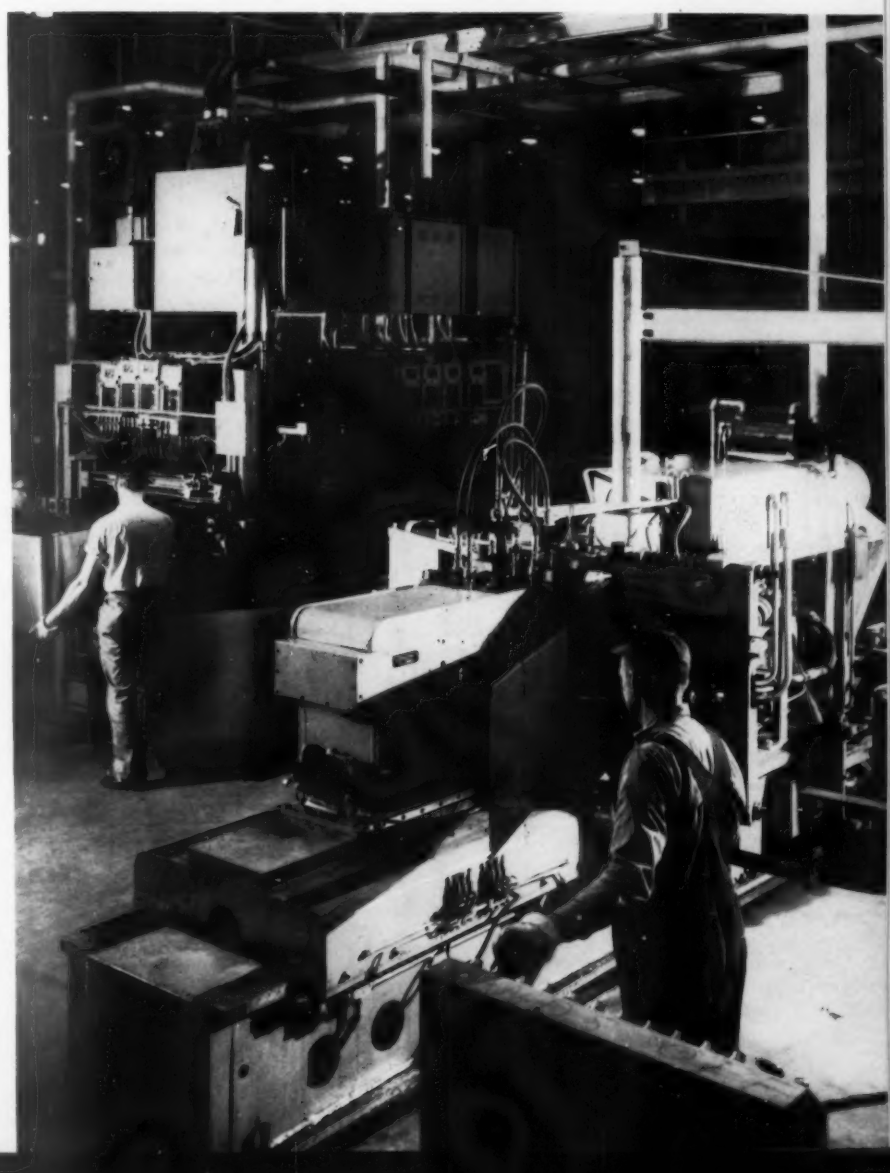
From this point on — until the cabinet is completely fabricated — welding plays an important role. The back sheets, back brace, and reinforcing angles are first welded to the shell. The large welder used for installing the backs produces ninety welds simultaneously.

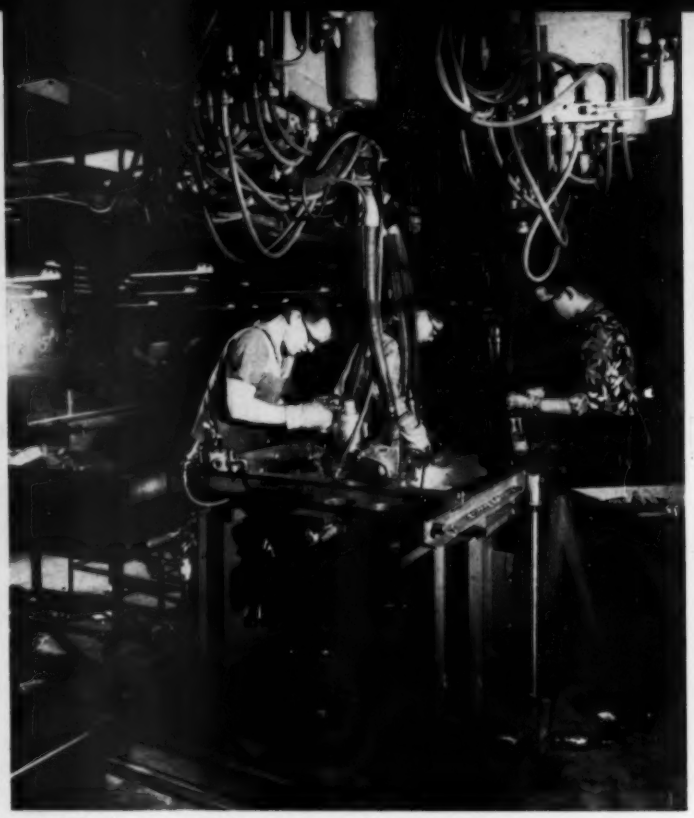
Then comes forming the bottom flange. The front panel, food compartment gussets and the door hinge bar are welded to the cabinet in a squaring and welding jig, using portable gun welders. Then comes welding the levelling screws on the cabinet and the bottom pan to the rear panel; drilling hinge mounting holes; and finally finish grinding and buffing. The completed cabinet is then delivered by belt conveyor to a point where it is transferred to an overhead conveyor that takes it to the phosphatizing machine.

Food compartment fabrication

In a separate press and fabrication area, large presses blank and form the tops, bottoms, and skirts for the inner liner or food compartment. Food compartments are made by seam welding a stamped, sheet metal top piece and bottom piece to a stamped and formed sheet metal skirt or wrapper that forms the sides and back.

The food compartment top is inserted into the left side of the welder, the bottom into the right. These are positioned by guide pins and held in place by electro-magnetic →





4. The front panel, hinge bar, and food compartment gussets are next to be welded to the shell. This is done in a squaring and welding jig.

5. The food compartment top is inserted into left side of welder, the bottom into the right, with the skirt fitting over outside. Welding is sequenced automatically.

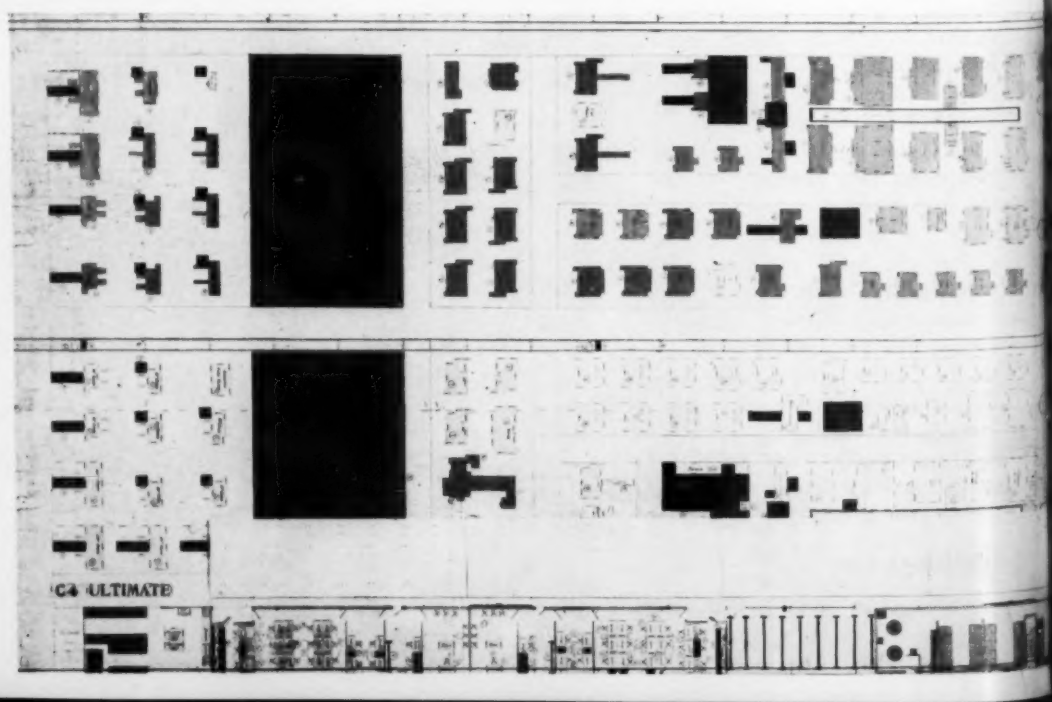
force. The skirt fits over the outside between the top and bottom. Welding is sequenced automatically.

The welded liners move through a metal finish line and are then taken by an overhead conveyor system to the pickling machine, and then to the porcelain enameling department.

The refrigerating unit

The Westinghouse refrigerating unit is made up of four basic components: the evaporator, the condenser, the compressor, and the temperature control. In the "Frost Free" models there is a fifth — the automatic defrost control. All of these components are assembled from many separate parts. A detailed description of refrigerator unit production is a story in itself. In this article we will touch on fabrication of the evaporator and the condenser, with oversimplified description.

The evaporator is made of two separate sheets of aluminum, each of which has furnace-brazed to one side a zig-zag shaped piece of aluminum tubing. The larger sheet of the two is bent into a rectangular shape that forms the sides and bottom of the finished evaporator. The smaller sheet is riveted to the larger sheet so as to form the back of the unit. The assembly is then charged with processed dry air at 200 pounds per



This section of the fabrication department shows shear room (left); sheared stock storage (black area); then heavy presses up to 500 tons. Conveyor line at right delivers fabricated doors from presses to welding and metal finishing. (Raw steel delivery, storage, scrap balers, etc., are at left of this area.)

et steel is cut to size on shears in background, and drawn, formed, trimmed, or d in the presses in the foreground. Panels for the door and door frames are d here. Also, many miscellaneous small parts—such as supports, hinges, brackets, gussets and similar parts for strengthening the cabinet.

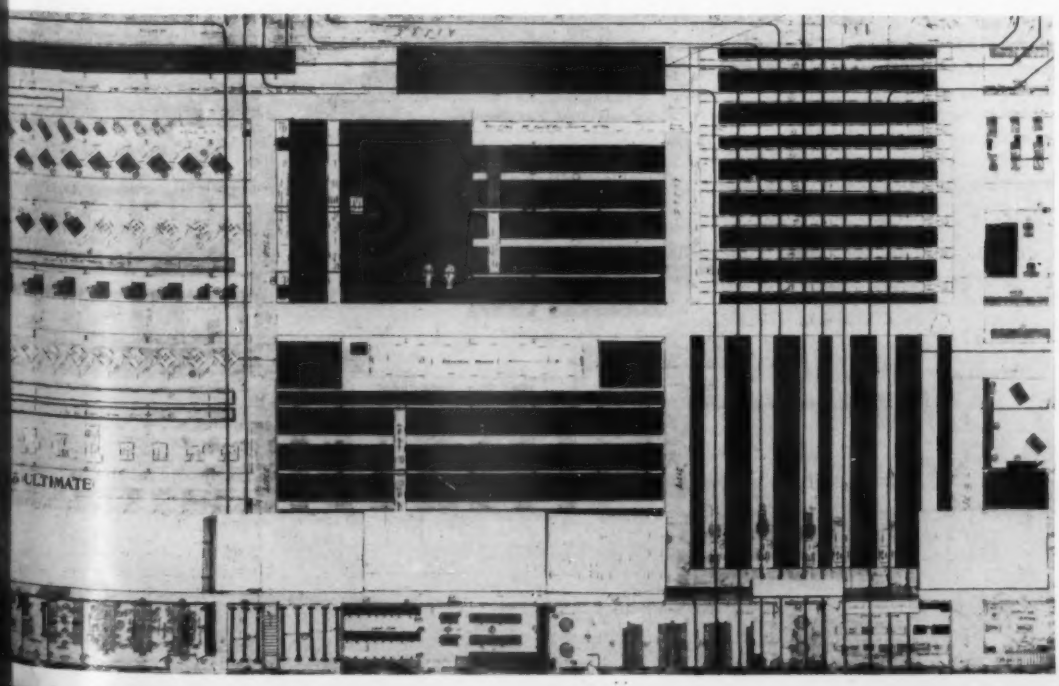
square inch and dipped in a water tank to test for leaks. The evaporator is then ready for anodizing.

The condenser is made up of three major parts: the back plate and two side rails. The back plate has two rows of crimp slots 2¼ inches apart down its entire length. Copper coated steel tubing is laid in the slots to form a zig-zag pattern and the slots are crimped closed over it. The side rails are formed and cut off in an automatic rolling machine using coil steel stock, and then welded to the back plate in a special multi-tip welder. The condenser is degreased; side brackets and yoke are welded in place for mounting the compressor; and rubber caps are placed over the ends of tubing to mask them from paint and to keep out dirt. The unit is then ready for finishing.

More to come

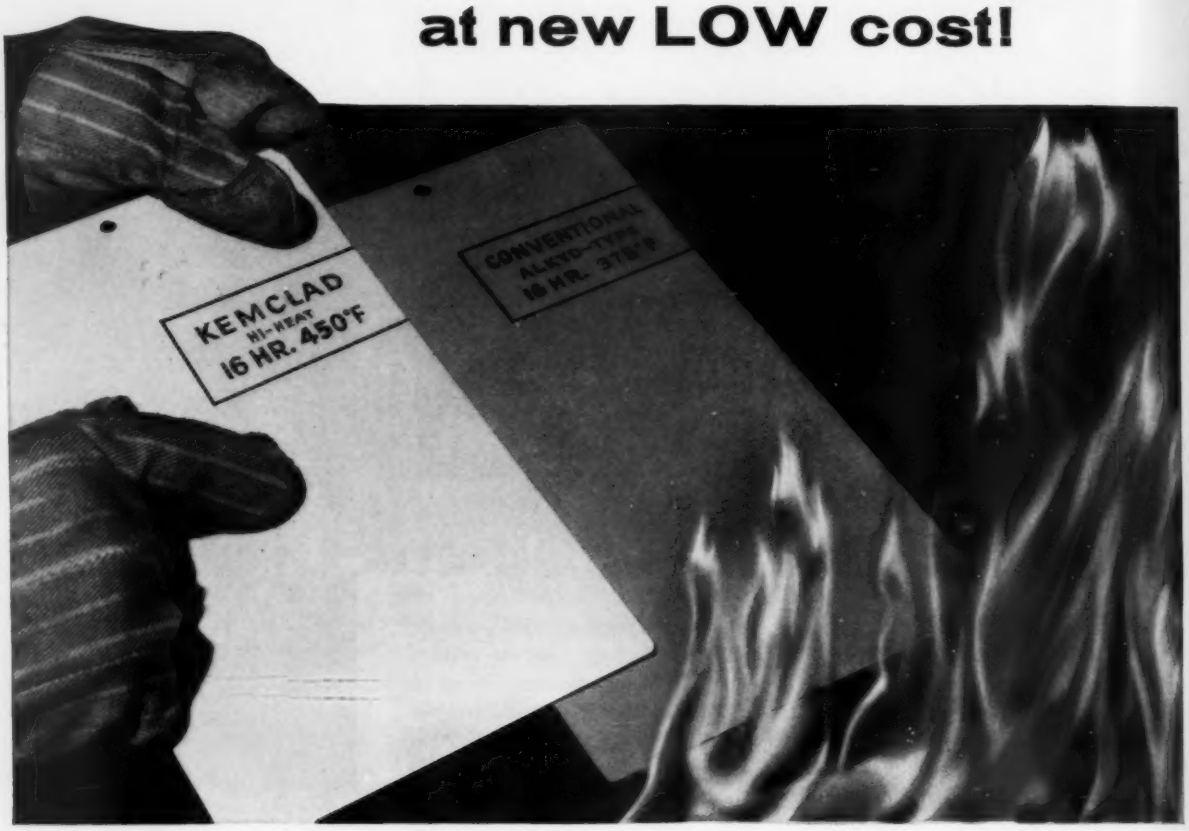
In succeeding articles to appear in forthcoming issues of *finish*, major departments and operations, following from fabrication through to packaging and shipping, will be described and illustrated.

***7.** Cabinet and door shells are first rough polished to remove burrs and rough spots left during fabrication. Then they are finish-ground and sanded. Here, door shells are being given the finish-grinding.*



At left are small presses up to 125 tons. Center section (black) represents die storage racks. At upper right area is for small parts storage in stationary bins. All feeder conveyor lines cross storage area at this point, delivering to production lines.

NOW... new HIGH heat resistance at new LOW cost!



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. . . a new achievement of Sherwin-Williams Industrial Research that opens the way to new savings in appliance finishing

Providing heat resistance approaching that of straight silicone enamels at approximately half their cost, KEMCLAD HI-HEAT ENAMEL offers important new advantages to builders of appliances and many other products.

The result of more than four years of research, this unique development combines more of the desirable properties of silicones with the basic advantages of the best organic coatings than has previously been possible except at excessive cost. A high-gloss, high-quality coating, it withstands sustained temperatures to 500° F. Flexibility, adhesion and resistance to hot grease exceed that of best conventional heat-resistant finishes.

For full details, contact your Sherwin-Williams Industrial Representative, or write The Sherwin-Williams Co., General Industrial Division, Cleveland 1, Ohio.

Panel at left, coated with new KEMCLAD HI-HEAT ENAMEL, shows no discoloration after 16 hours exposure to 450° F. Panel with conventional, alkyd-type, heat-resisting finish is discolored after 16 hours at 375° F.

- PROVIDES MORE PROPERTIES of silicones, at lower cost
- NON-YELLOWING at temperatures to 500° F.
- HIGH FLEXIBILITY . . . adhesion . . . grease resistance . . . gloss retention

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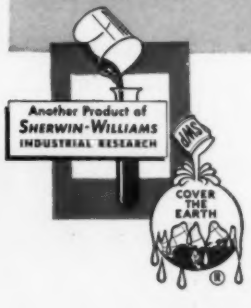

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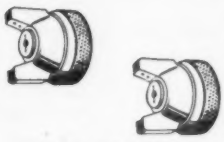
—many for ceramics



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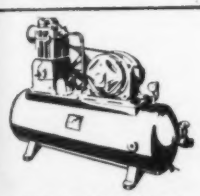
for applying heavy materials



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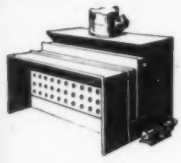

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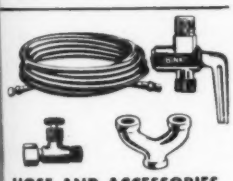
over 510 styles and sizes



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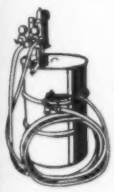
all accessories



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9 models

OIL AND WATER EXTRACTORS
7 models to supply clean, dry air

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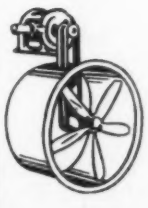

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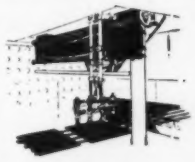
21 models—each meeting safety standards



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Market and statistical review of typical segments A

THE volume producing appliance and fabricated metal products manufacturing field produces millions of units a year which are in turn worth billions of dollars.

In order to maintain this high rate of production, these plants must buy and use billions of dollars worth of materials, equipment, components and services.

A few examples of what is needed to keep these plants in operation:

Plant A — Fabricates and ships in excess of 100 tons of sheet metal a day.

Plant B — Receives between 80 and 100 large highway trailers loaded with materials *per day*, including such items as:

- 4 miles of tape
- 600 gallons of white enamel
- 2,000 gallons of grease and oil
- 6 carloads of packaging materials
- 200 tons of sheet steel
- 93 tons of bar steel
- 41 miles of electric wiring
- 20 tons of electric motors

Plant C — Receives 60 carloads of raw materials *per day*, including:

- 410 tons of steel
- 4 carloads of packaging materials
- $6,283 worth of finishing materials

Plant D — Uses the following materials for packaging *each day:*

- 3 miles of tape
- 1,500 pounds of steel strapping
- 25 tons of corrugated fibre board
- 4,000 sq. ft. of crepe cellulose

Plant E — The following facts:

- 40 miles of conveyors
- 80,000 kva power supply system
- 300 railroad cars and 200 trucks in and out per day
- boiler house with capacity of 900,000 lbs. of steam per hour

SUMMARY OF SHIPMENTS

(Typical segments only—data not available for many important groups)

Product	Units Shipped 1952	Units Shipped 1953
Air Conditioners, room	365,451	1,075,000
Electric Appliances	54,222,150	63,102,000
Cooking & Heating Equipment (Non Electric)	11,100,851	9,634,031
Home Laundry Equipment	4,067,471	4,411,366
Plumbing Ware	5,262,551	5,523,961
Steel Containers	92,917,000	103,582,788
Steel Kitchen Cabinets	2,970,000	3,441,000
Vacuum Cleaners	2,841,803	2,777,756
Total Units	173,747,277	193,547,902

PLUMBING FIXTURES

(Units Shipped)

Product	1953	1952	1951	1950	1949	1948
Lavatories						
Cast Iron	1,337,865	1,217,333	1,630,554	1,813,000	1,385,000	1,568,000
Steel	212,727	219,374	232,699	276,000	153,000	227,000
Total	1,550,592	1,436,707	1,863,253	2,089,000	1,538,000	1,795,000
Kitchen Sinks						
Cast Iron	1,021,395	1,000,835	1,212,586	1,415,000	1,124,000	1,545,000
Steel	1,064,070	1,015,328	1,196,859	1,478,000	984,000	1,086,000
Total	2,085,465	2,016,163	2,409,445	2,893,000	2,108,000	2,631,000
Bathtubs						
Cast Iron	1,434,881	1,355,181	1,504,471	1,815,000	1,215,000	1,504,000
Steel	453,023	454,500	413,477	493,000	261,000	396,000
Total	1,887,904	1,809,681	1,917,948	2,308,000	1,476,000	1,900,000

Source: Facts For Industry

Appliance & Metal Products manufacturing field

ELECTRICAL APPLIANCES

(Sales)

Product	1952 Units	1952 Retail Value	1953 Units	1953 Retail Value
Coffee Makers	3,000,000	60,185,500	3,685,000	73,515,750
Dehumidifiers	87,450	12,505,300	98,000	13,715,100
Dishwashers	175,000	52,500,000	180,000	54,000,000
Fans	3,075,000	109,896,500	4,101,000	144,818,800
Food Waste Disposers	260,000	33,800,000	353,000	45,890,000
Freezers	1,140,000	421,800,000	1,200,000	480,000,000
Heaters	1,202,000	31,203,000	1,380,000	36,235,250
Hotplates	905,000	8,597,500	695,000	6,602,500
Irons	6,235,000	97,384,000	7,215,000	117,022,250
Radios	7,692,000	261,377,100	8,379,000	275,723,850
Ranges	1,060,000	270,300,000	1,300,000	332,800,000
Refrigerators	3,570,000	1,017,450,000	3,775,000	1,113,625,000
Roasters	425,000	17,850,000	470,000	20,690,000
Television	6,096,000	1,719,072,000	7,000,000	1,995,000,000
Toasters	2,975,000	59,727,700	3,165,000	63,351,750
Waffle Irons	1,456,000	29,848,000	1,529,000	32,873,500
Water Heaters	720,000	95,040,000	862,000	113,784,000
Water Systems	682,000	110,484,000	720,000	122,040,000
Other Small Appliances*	13,466,700	271,580,100	16,995,000	387,834,000
Total	54,222,150	$4,680,600,700	63,102,000	$5,429,511,750

*Including: Blenders, Deep Fat Fryers, Floor Polishers, Food Mixers, Shavers, Broilers, Clocks.

Source: Electrical Merchandising

COOKING AND HEATING EQUIPMENT—NON ELECTRIC

(Units Shipped)

Product	1952 Units Shipped	1952 Value	1953 Units Shipped	1953 Value
Cooking Stoves and Ranges	2,424,216	$201,803,000	2,390,522	$205,917,000
Gas	2,099,879		2,112,359	
Bungalow Ranges	49,000		50,452	
Coal & Wood	105,486		85,169	
Combination Ranges	49,923		30,973	
Kerosene, Gasoline & Fuel Oil	119,928		111,479	
Domestic Heating Stove	3,804,202	89,157,000	2,814,743	77,346,000
Floor and Wall Furnaces	547,796	34,383,000	544,997	34,427,000
Water Heaters	2,615,902	107,968,000	2,219,679	11,647,000
Oil Burners	781,036	N.A.	657,798	N.A.
Residential	744,619		619,403	
Commercial and Industrial	36,417		38,395	
Warm Air Furnaces	927,699	187,987,000	1,006,292	202,315,000
Total	11,100,851	$621,298,000	9,634,031	$531,652,000

Source: Facts For Industry

(N.A. — Not Available)

ROOM AIR CONDITIONERS

(Units Shipped)

	1946	1947	1948	1949	1950	1951	1952	1953
Window-Sill Type	16,409	24,026	62,592	78,454	187,224	228,964	357,106	1,055,000
Floor Type	13,426	18,878	11,046	10,866	13,687	8,526	8,345	20,000
Total	29,835	42,904	73,638	89,320	200,911	237,490	365,451	1,075,000
Estimated Retail Value.					($72,000,000	$86,500,000	$141,700,000	$420,500,000)

Source: Air-Conditioning and Refrigeration Institute

HOME LAUNDRY EQUIPMENT

Product	1952 Units	1952 Retail Price	1953 Units	1953 Retail Price
Domestic				
Washing Machines	3,174,588	$671,266,632	3,460,396	$772,983,258
Ironing Machines	202,143	42,947,301	154,466	33,051,090
Dryers	614,677	157,474,100	696,468	170,007,838
Sub Total:	3,991,408	871,688,033	4,311,330	976,042,186
Export				
Washing Machines	66,612	14,900,438	86,123	17,941,143
Ironing Machines	4,283	552,286	5,106	708,508
Dryers	5,168	1,295,883	8,807	2,160,180
Sub Total:	76,063	16,748,607	100,036	20,809,831
Grand Total:	4,067,471	$888,436,640	4,411,366	$996,852,017

Source: American Home Laundry Manufacturers' Assn.

VACUUM CLEANERS

Product	1952 Units	1952 Estimated Retail Price	1953 Units	1953 Estimated Retail Price
Vacuum Cleaners	2,841,803	$260,081,000	2,777,756	$262,277,000

Source: Vacuum Cleaner Manufacturers' Assn.

STEEL KITCHEN CABINETS

	1952	1953
Units Sold	2,970,000	3,441,000
Retail Value	$154,000,000	$178,000,000

Source: Steel Kitchen Cabinet Manufacturers' Assn.

STEEL CONTAINERS

(Annual Shipments)

	1947	1948	1949	1950	1951	1952	1953
19 Gauge & Heavier.... 13 Gallons & Larger.....	27,062,000	27,070,000	23,110,000	26,241,000	29,763,000	24,028,000	N.A.
Lighter Than 20 Gauges.. 12 Gallons & Larger.....	6,032,000	7,346,000	6,080,000	7,817,000	8,290,000	7,603,000	N.A.
Heavier Than 29 Gauge.. 12 Gallons & Smaller....	57,581,000	57,255,000	52,765,000	66,129,000	73,681,000	61,286,000	N.A.
Total	90,675,000	91,671,000	81,955,000	100,187,000	111,734,000	92,917,000	103,382,788

Today's annual production of the industry is valued at a quarter billion dollars. The industry regularly employs approximately 12,000 people and ranks second only to the automotive industry in the Nation's consumption of sheet metal.

Source: Steel Shipping Container Institute, Inc. and Facts For Industry

(N.A. — Not Available)

New Vitro Chalkboard Colors

Especially developed by Vitro for application on enameling steel, Vitro chalkboard colors are unequalled in appearance, wear resistance and performance (both during and after application). Extensive tests—conducted by an independent laboratory—prove these new colors give a superior writing surface that lasts longer without glossing. Actually, they retain their matte finish indefinitely.

From a production standpoint, Vitro chalkboard colors can be economically fired at low temperatures with no fear of metal warpage. They provide greater coverage per pound and assure easier gloss control. Want more information or a demonstration? Write us today—there's no obligation.

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Yellows

Whites

Greens

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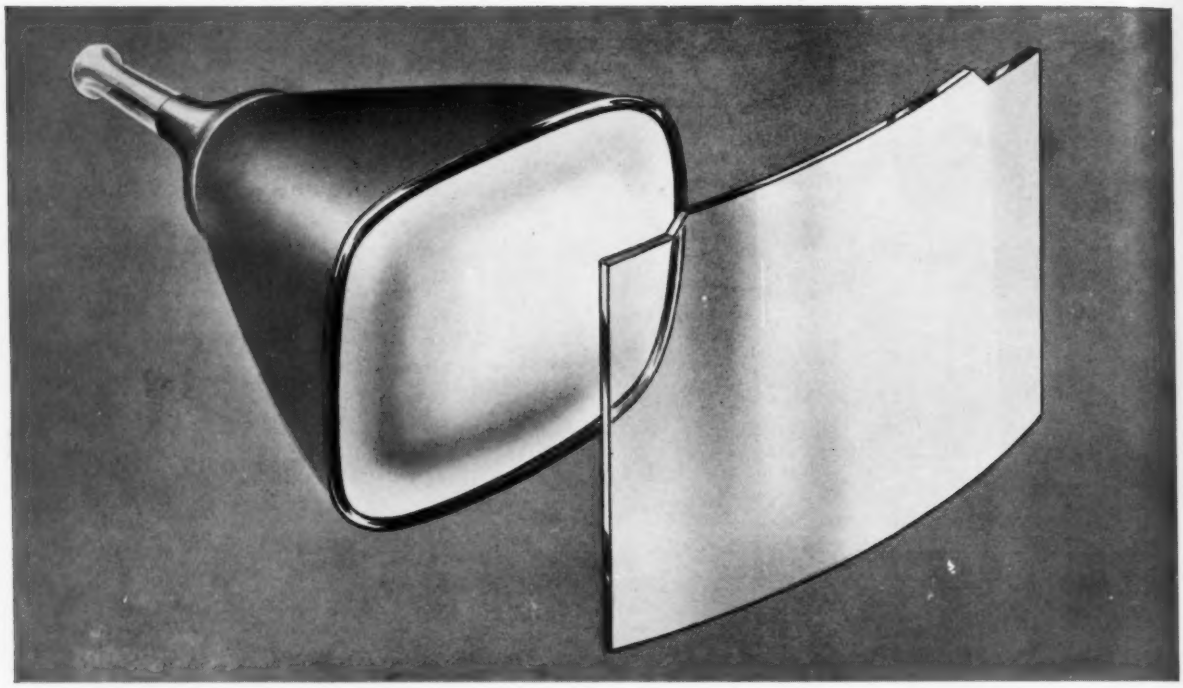

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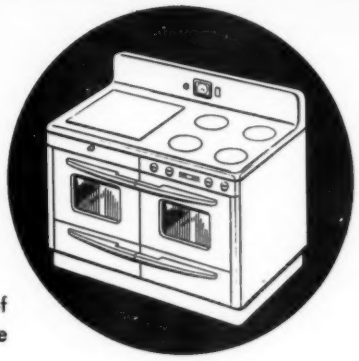

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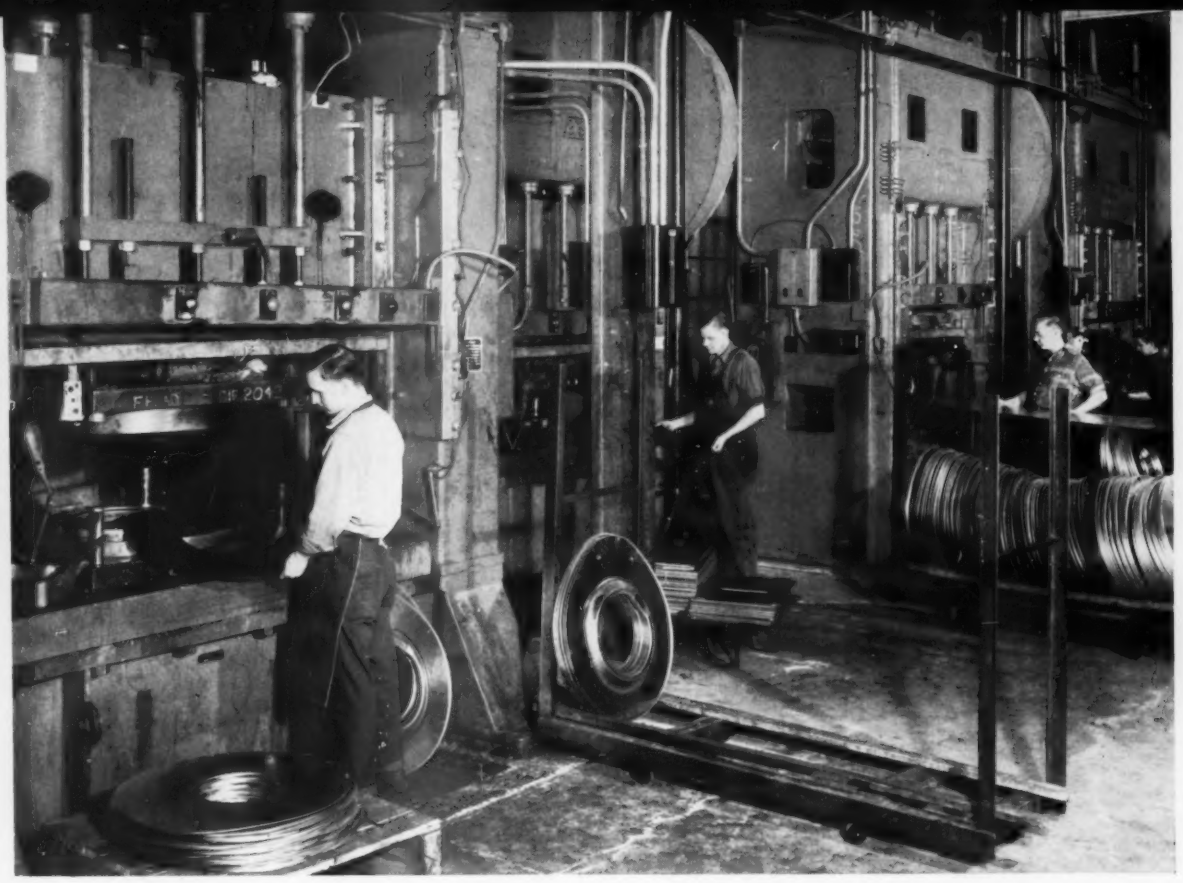


This familiar round component goes through several stamping operations before it reaches its final form.

Producing the Hamilton clothes dryer

highly conveyorized operation carries component parts from fabrication through finishing and assembling

by Arthur Q. Smith • AMERICAN GAS ASSOCIATION

THE current vogue in labor-saving household appliances is the automatic clothes dryer. Following a long line of other appliances which started out as novelties and within a short time became necessities — such as the streamlined automatic ranges, mechanical and gas refrigerators, washing machines, dishwashers—is now the laundry dryer. Sales of this appliance reached a total of some 705,275 units during 1953.

In the manufacture of these appliances the same quality of materials and precision workmanship will be found as in other household appliances which are built to last many years and give maximum satisfactory performance.

One of the leaders in the field of laundry dryers is Hamilton Manufacturing Company, Two Rivers, Wisconsin. This company, established in 1880, makes a variety of products including wood and steel laboratory furniture for scientific uses, wood and metal furniture for schools and libraries, a line of dental furniture, drafting equipment, and a surgical equipment line.

Medical furniture, juvenile furniture, architects and drafting room furniture are made in their completely equipped modern woodworking and metal fabricating shops. With these facilities it was but a short step to pioneer and organize the production of a laundry dryer.

The existing metal fabricating facilities were supplied with the necessary tools to stamp out various parts of the dryer. In order to meet the heavy production schedule and present-day demands for clothes dryers, new facilities were required in the metal finishing department. This included a modern semi-automatic paint spraying section, a gas-

Hamilton's automatic clothes dryers start out in the metal stamping shops where sheet steel is cut to size for the different component parts.

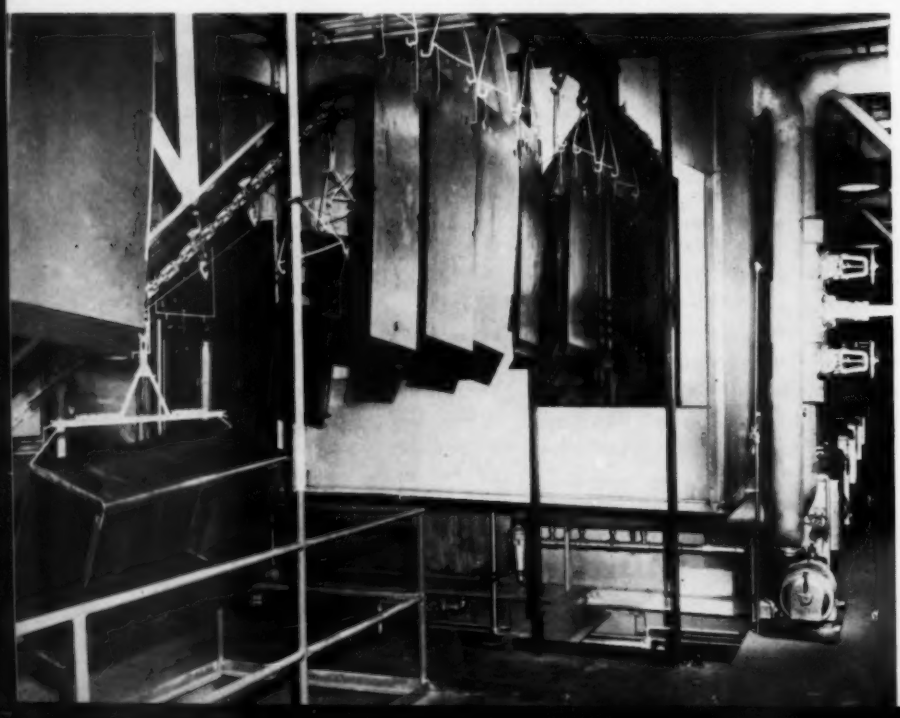
fired paint drying and curing oven as a part of the general expansion and modernization program of the entire plant.

Highly conveyorized operation

These facilities were housed in a completely new steel structure, 221 feet long by 53 feet wide, which was added to the upper floor of the steel fabricating plant. More than a mile of automatic conveyors, in three separate lines, are used in moving fabricated steel parts from the press and welding operations through the new finishing plant and from there to assembling and trimming.

Three entirely separate conveyor lines, originating from different areas of the steel fabricating plant, pass through all stages of the finishing operations. This lends considerable flexibility in that fabricated metal parts can be hung on any one line or on all three of the conveyor lines so that every metal product can be subjected to the multiphase finishing process.

Three conveyor lines from the fabricating shops converge on the phosphatizing unit which prepares the metal surfaces for paint application.

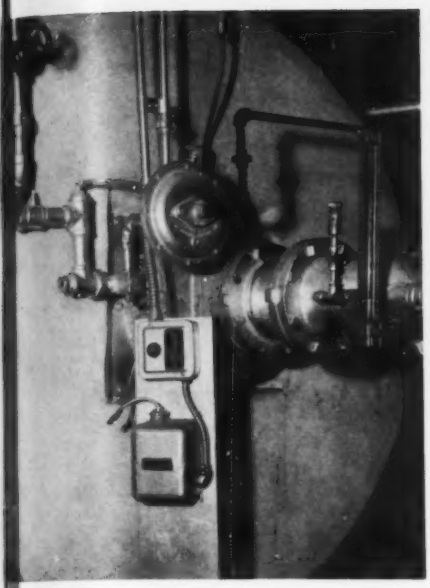


Phosphatizing

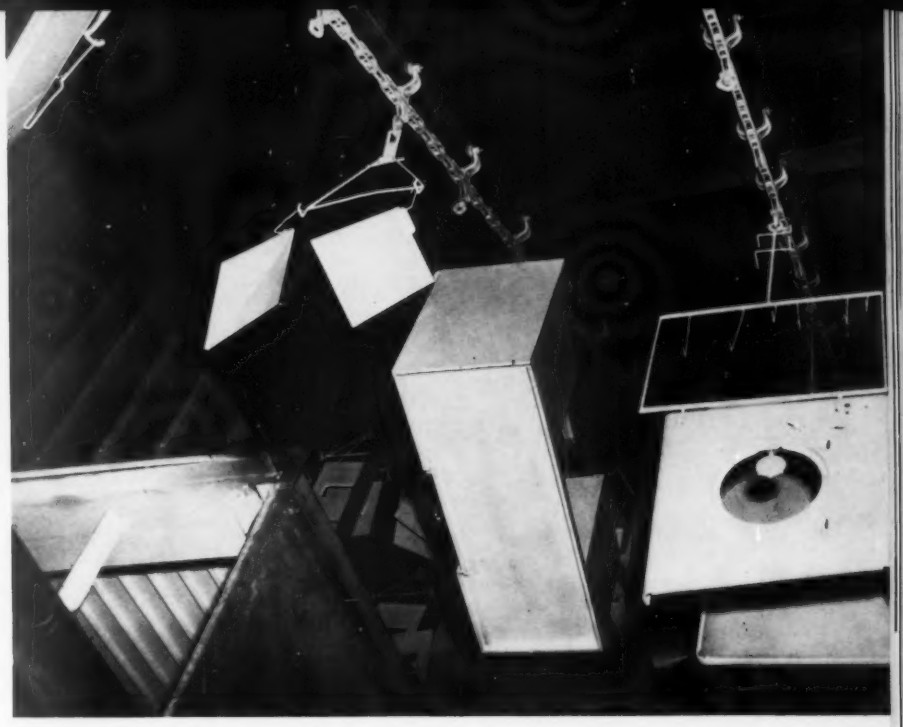
Each metal part or unit is first subjected to a phosphatizing treatment which chemically cleans, rustproofs and creates a chemical film on the part for added corrosion resistance and insuring a perfect bond with the final finish. A total of 17 minutes is required for each item to pass through this complete phosphatizing process which involves six separate stages: First, each item is subjected to a chemical wash followed by two separate hot water rinses to assure that each metal part will be chemically clean. Next follows a phosphatizing treatment which converts the steel surface into a zinc-iron-phosphate complex which slightly etches the metal surface and deposits a surface-film assuring a perfect bond with the final finish. Then a cold water rinse and a chromic acid rinse remove any traces of chemical salts which may affect the finish coat. Following this treatment, the items pass through a dry-off area where warm air at high velocity assures that the treated items will be bone dry before the application of a finish coat.

The Hamilton metal-treating equipment is unique because this installation represents the first time that three separate conveyor lines have been arranged to travel simultaneously through a phosphatizing process. This has demanded the use of tanks and associated equipment of much greater size than anything constructed heretofore.

The second phase of the finishing process is the application of the finish itself. These facilities are in the new structure which was added as another floor of the steel fabricating plant. Two separate types of spray equipment are provided. Two of the three conveyor lines go through manual spray booths providing a battery of 12 spray positions. The system employs a water curtain and a high capacity exhaust and air conditioning system which assures that tempered, dust free air is maintained through



Low pressure gas burner on the external air heater of the paint oven has an hourly input of 3,000,000 Btu's.



After painting, the clothes dryer parts move through a gas-fired oven where, at temperature of 375°, circulating air cures the paint finish.

every stage of the finishing operation. The manual spray application is primarily used for large units and formed or welded parts to assure that complete paint coverage is obtained on all areas of the items to be finished.

The third of the three conveyor lines goes through a series of automatic spray booths in which electrostatic devices are used for maximum efficiency in paint deposition.

After spraying, all parts are carried by the conveyors to the direct fired gas ovens for heat treatment. These thermostatically-controlled ovens are maintained at just the proper temperatures and air flow to assure good bond and luster to the finished parts. After processing in the ovens, the finished parts are conveyed to assembly for completion.

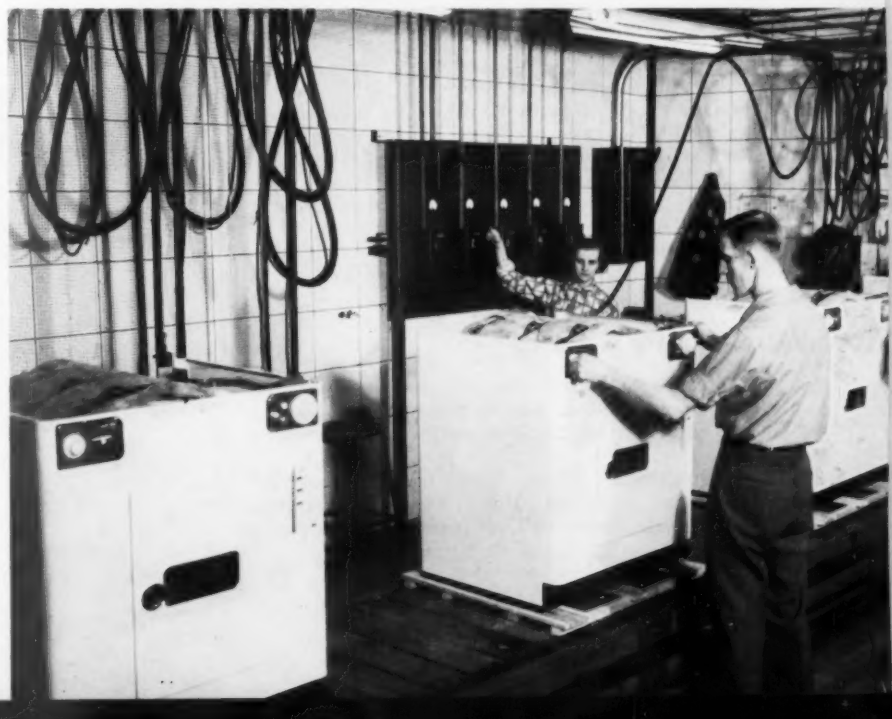
The finishing process requires about 45 minutes for cleaning and spraying and an additional 45 minutes in the bake ovens. The conveyor lines move at a uniform speed of 10 feet per minute and the complete cycle for the longest line, from the loading station until the empty racks return from the assembly department, consumes a time of approximately four hours.

Here are some interesting facts showing the magnitude of the complete installation. The 170 foot long phosphatizing machine consumes 7,000 pounds of steam per hour at 5 pounds pressure, while the dry-off oven uses 2,000 pounds of steam per hour at 100 pounds pressure. Five separate blowers supply clean, filtered, tempered air at the rate of 144,000 cubic feet per minute. In the winter, at —20° F, this air conditioning system will use 18,000 pounds of steam per hour at three pounds pressure.

The paint baking oven is designed to maintain temperatures as high as 375° F. Three thousand cubic feet of natural gas are consumed per hour with a rated hourly input of 3,000,000 Btu's. The oven has a separate air circulating system supplying 37,000 cubic feet of fresh air per minute.

For the operation of the complete finishing system, 31 separate motors are used with a total requirement of 250 horse power.

Following final assembly, each dryer is put through a series of tests to insure its perfect operation when it reaches the customer's home.



THE finish LINE

an EDITORIAL FEATURE

by Dana Chase • EDITOR

THERE was a guest editorial feature in the January 1954 issue of FINISH entitled "Home Appliances in Color". This feature, as you will remember, was by Charlotte Eaton Conway, Equipment and Appliance Editor, HOUSE BEAUTIFUL Magazine. Mrs. Conway made this statement to us in 1952: " . . . the trend in kitchen design and kitchen planning has changed materially. What people want now is some version of the living-kitchen idea . . . " It was Mrs. Conway's opinion at that time that we would soon be seeing major home appliances in color.

In response, we outlined the inherent difficulties and inefficiencies in attempting to run multiple color products on today's straight-line appliance production lines. We were convinced then that the big producers of home appliances would have slight interest in producing colored products.

In an editorial accompanying Mrs. Conway's feature in our January issue, we had to admit that the situation had changed, for we knew then that "home appliances in color" were to be presented to the public by at least some of the major manufacturers early in 1954. (As we all know, there *have* been new products appearing in color over a period of several months).

Nothing new in the world

All I would like to do at this point is to demonstrate again that "there is nothing new in the world" by showing that in the present color trend, history is merely repeating itself.

In 1926, fresh from college, I had taken my first job with an appliance producing plant in Ohio, and that year I attended my first American Gas Association Convention in Atlantic City to set up a product display as part of the big AGA Exhibit on Steel Pier. All of the major manufacturers were present with their latest gleaming models in white ranges and other allied appliances.

Soon after the Exhibit opened it was discovered that a crowd, including a very high percentage of women, was congregating in one corner of the Exposition Hall. Here, in one of the most inconspicuous places imaginable, a manufacturer of porcelain enamel had taken a tiny booth in which he was displaying a few samples of standard makes of gas ranges which he had made over in brightly colored porcelain.

By the time the convention was over, practically all of the retail sales managers of the gas companies had learned about the new idea in ranges, and the fight began to work out plans for their manufacture and sale.

Manufacturers see a "RED" spectrum

In the meantime, the press had picked up the story, including the Atlantic City papers on a local scale and such sales magazines as PRINTERS INK on a national scale. Then came the manufacturers' reactions. As one editor stated it, under a heading "Making the Manufacturers See 'Red' " — "Mention 'Color' " to a manufacturer of enamel products, and instead of seeing the spectrum in all its multi-colored beauty all he can see is 'Red'. Then, color, as used by the manufacturer, does not create a pleasing visual sensation. Instead, it causes paralysis of the optic nerves, distended nostrils, heaving chest, gritting teeth — and a line wrought and fused by mountainous overhead, caused by half-idle enameling plants, piles of rejects and various unsaleable numbers.

"This almost invariable reaction on the part of the producers is not due to a lack of appreciation of the beauty. It is caused by the seemingly insurmountable task of producing colored enamel products, economically, and with a fair margin of profit . . . "

A few months following the AGA Convention in Atlantic City, a group from a Convention held in Detroit were invited to visit an Exhibit of Colored Enameled Stoves at the Silverine Porcelain Enameling Company in that city. The ranges were described as follows: One had cream col-

PPLIANCES IN COLOR
ISTORY REPEATS ITSELF

gs, robin's egg blue panels and cream borders; a second ad blue legs, gray panels and pink borders; a third was combination of green panels and splashers with white door anels; the fourth, a "Beautiful" combination of pastel hades in pink, cream and robin's egg blue — according to he description, "made this stove stand out prominently". The fifth product was an ice box with marble grained exterior.

Appliance colors in the late twenties

Here are a few comments from a letter sent by a manufacurer of finishes to customers *about 1928*. It reads in part:

"The old idea of a sterilized whiteness seems to have een replaced by the desire on the part of the housewife to ave her kitchen or kitchenette an integral part of the real ousehold, and a thing of beauty, rather than a separate omain presided over only by the cook and resembling nore than anything else, a hospital ward in appearance.

"The kitchen cabinet manufacturers were the first to ecognize this trend and to cater to it. We now have on the narket, both gas and coal stoves, enameled in attractive olors, and even pots and pans in the same colors to harmonize with the color scheme of the entire household.

"We have, of course, all hoped that this demand for olors would not materialize, for the matching of colors in orcelain enamel is an art in itself, and only adds to the roblems which the busy production executive has to face. ut the demand is here, and the manufacturer who meets it ill, in these days of intense competition, be the manufacturer who has his factory running full force all the time."

Remember this was 1928.

In 1930, marble grained ranges were almost a standard roduct.

It wasn't long until Macy's and many other stores throughut the country were producing booklets on color in the itchen and the country's leading magazines had taken up he subject editorially. Color was on the way.

The manufacturer of finishes, of course, went on to offer complete service and assistance in connection with the development of colored appliances.

After the colored appliances had been developed, produced, offered and accepted by the public, a survey was made of the manufacturers to determine the effect on inventories, shop problems, and profits.

What about profit margins

According to most of the answers in the survey it was indicated that color had not given the manufacturer serious inventory problems or shop problems. As would be expected, mill rooms in the porcelain enameling plants had to be expanded to handle the additional colors. Despite the fact that the cost of producing colored appliances was greater than the cost of producing the same appliances in white, the margin of profit was greater due to the premium price received for the colored items.

It would certainly be discounting the obvious if we weren't to acknowledge that there will be shop problems in connection with the production of colored appliances, particularly in the mass production plants. I want to be the first to admit our surprise that among the first manufacturers to initiate the current color trend are examples of the largest straight-line producers.

In this instance, *it is a question of "sales" taking precedence over ease of production,* and the decision of top management and sales management to give the public what it wants in the interests of keeping the sales channels open and the plants at profitable production levels.

I have no fear that the production men witll handle the problems inherent in this color trend just as they did in the late 20's. By close cooperation between the producers of materials and those who supervise the finishing plants, it is to be expected that management and sales management will get what they have requested, and in high quality products.

Re-edited for Finish from a talk prepared by the author for presentation before the Eastern Enamelers Club at Philadelphia.

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Age doesn't dim its COLORFUL BEAUTY

Porcelain Enamel doesn't fade, stain or scratch. Its permanent sparkling beauty and color provide important advantages for many products for the home where a durable pleasing appearance is desired.

Non-Porous Surface is SANITARY, EASY-TO-CLEAN

The glass-hard, smooth surface of Porcelain Enamel has no pores to harbor germs, dirt or foreign matter. Soil is readily removed, usually by a damp cloth or with soap and water. This is an important advantage, especially appreciated in household products.

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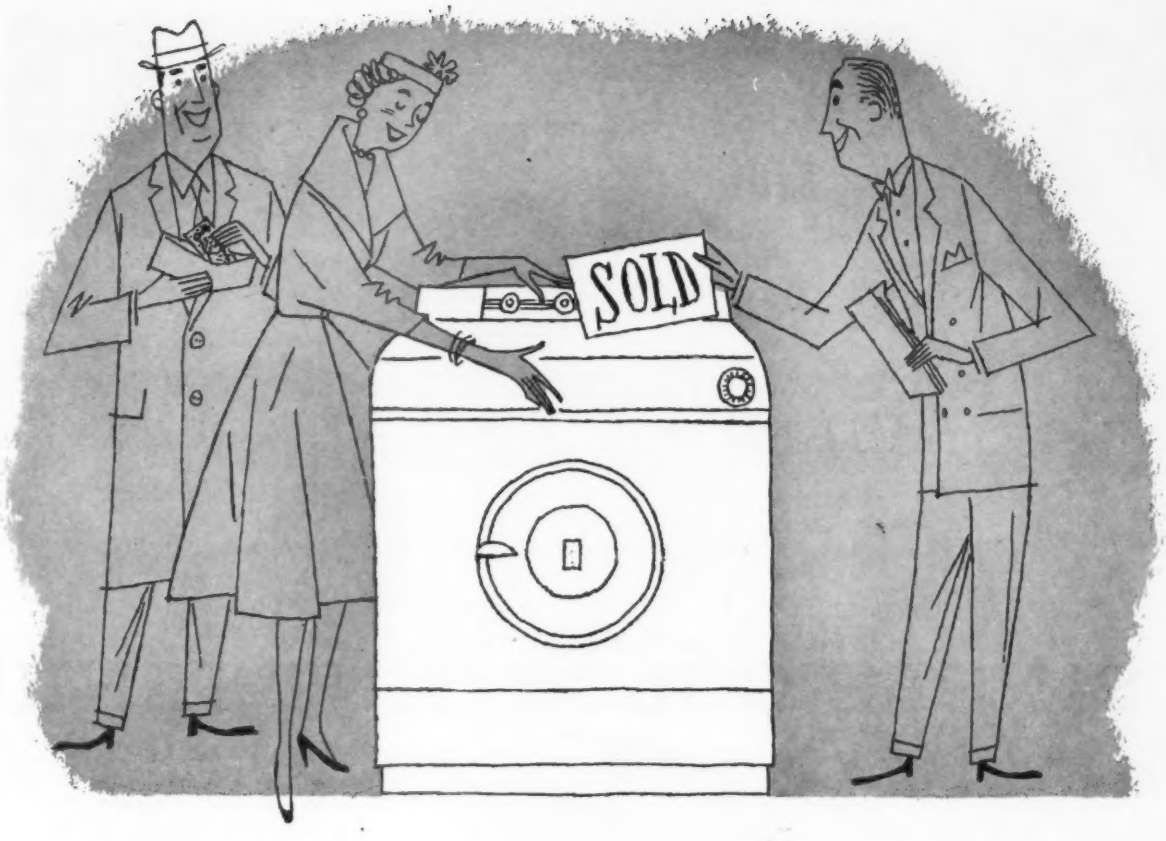

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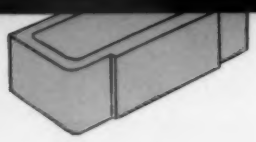

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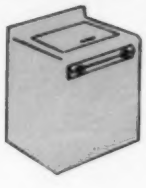

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D. G. MOORE

N. B. BALINT

Bureau of Standards studies relating to porcelain enamel, ceramic coatings

briefs of papers prepared for the American Ceramic Society annual meeting

An investigation of the effects of the nickel dip on the adherence of ground coat enamels to steel

by D. G. MOORE, J. W. PITTS, *and* W. N. HARRISON

An investigation was made of the effect of firing time and the weight of nickel deposited from the nickel dip solution on the adherence developed by a cobalt-free and a cobalt-bearing ground-coat enamel on both enameling iron and a titanium bearing low-carbon steel. It was found that the maximum benefit from the nickel on the adherence index (as measured with the PEI meter), came early in the firing treatment, with the effect of the nickel dropping markedly with longer firing times. It was also found that there was an optimum nickel deposit for maximum adherence development. This optimum was approximately 50 mg/ft² for specimens pickled in sulphuric acid and about 80 mg/ft² for sandblasted specimens.

A possible test for delayed fishscaling was described. This consisted of placing the specimens after firing in a dryer at 125°C for 48 hours. It was found the nickel dip helped to reduce the amount of fishscaling observed after this heating treatment. The fishscaling resistance seemed to be related to the PEI adherence index with no specimen with an adherence index of 70 or over showing fishscaling tendencies.

Metallographic studies of the interface of coated specimens indicated that nickel when plated on the steel from an aqueous solution functions in much the same way that cobalt does when it is present as ions in the coating layer. Both conditions produce roughening of the steel surface by galvanic corrosion but the effect of the nickel decreases with increased firing time inasmuch as there is no opportunity for regeneration of the nickel deposit as is the case when cobalt oxide is present in the enamel.

A radioisotope study of the nickel dip

by J. C. RICHMOND, H. B. KIRKPATRICK *and* W. N. HARRISON

Experiments were performed to (1) study the effect of surface pretreatment on the amount of metallic cobalt deposited at the enamel-metal interface during firing of a cobalt-bearing ground coat on iron, using a radioactive cobalt-bearing ground coat, (2) to study the effect of surface pretreatment of enameling iron on the amount and distribution of nickel deposited from the nickel dip, using a radioactive nickel dip solution, and (3) to study the physical location and chemical form of the nickel deposited from the nickel dip on iron after application and firing of cobalt-bearing and cobalt-free enamels, using specimens which had been treated in radioactive solution.

The use of radioactive nickel in the nickel dip was found to offer many advantages for studying the deposition of nickel by this process. Autoradiographs gave a true picture of the actual distribution of the deposit, with good resolution. Radioassays gave a quick, non-destructive method of determining the amount of nickel deposited, and repeated radioassays could be made on the same area of a specimen to evaluate the effect of various treatments on the amount of nickel retained by the iron.

The results of the several experiments may be summarized as follows:

1. Nickel from the nickel dip had little or no effect on the deposition of cobalt metal during firing of a cobalt-bearing enamel on iron.

2. Surface preparation markedly affected the deposition of cobalt metal during firing of a cobalt-bearing ground coat on iron. Heavier deposits occurred on sandblasted than on pickled iron.

3. The nickel deposited from the nickel dip was always non-uniform, but the scale of non-uniformity was markedly affected by the prior treatment of the metal.

4. Heavy deposits of nickel from the nickel dip occurred at areas which had previously been subjected to severe cold work.

5. The amount of nickel deposited in the nickel-dip treatment of enamel-

ing iron was markedly affected by the prior treatment of the steel. Heaviest deposits occurred on sandblasted iron, next heaviest on polished iron, and lightest on pickled iron. Pickling after sandblasting or polishing prior to the nickel dip treatment reduced the amount of the deposit, as did excess time in the rinse water following pickling.

6. The nickel from the nickel dip remained as metal at the enamel-metal interface during firing of both cobalt-bearing and cobalt-free enamels on nickel-dipped iron. There was no evidence of oxidation of the nickel followed by solution into the enamel glass, but there was some evidence that part of the nickel may have been separated from the metal by undercutting, particularly on continued firing.

This investigation was conducted at the National Bureau of Standards under the sponsorship of the National Advisory Committee for Aeronautics.

Some experiments in comparing the resistance of enamels to corrosion by alkaline solutions

by H. B. KIRKPATRICK, N. B. BALINT *and* J. C. RICHMOND

Experiments are described which show the effects of certain variables on the rate of dissolution of a sheet-steel enamel by sodium hydroxide solutions. These variables are temperature, concentration of solution, amount of specimen surface per unit volume of solution, and agitation of solution and position of specimen. The results indicate that in designing test apparatus to measure the alkali resistance of enamels, adequate temperature control must be provided and consideration must be given to the geometry of the apparatus and position of specimens.

Under conditions of mild attack, colorimetric determinations of silica dissolved in the test solution furnish a more sensitive measurement than do weight losses. Such silica determinations also gave less erratic results than weight-loss measurements, in studying the alkaline corrosion of cast-iron enamels.

Studies of oxidation behavior of enameling iron during firing

by A. G. EUBANKS, J. C. RICHMOND, *and* D. G. MOORE

An analytical balance with attachments for recording weight changes on a strip chart was used in conjunction with a resistance heated furnace to determine weight changes occurring during the firing of porcelain enamel on ingot iron. Enameled platinum specimens were weighed during firing and these results used to correct for connection currents in the furnace and for loss of weight of the coating during firing due to volitilization.

It was found that enamel coatings alone lose weight before fusion in proportion to the amount of coating applied but that after fusion the weight lost is a surface function rather than one of volume.

It was also found that pickled ingot iron under porcelain enamel gained more weight before fusion than sandblasted ingot iron and that the weight change of the two after fusion was about the same. This result had previously been obtained by K. Kautz using a different method.

In comparing cobalt bearing enamel with adherence-oxide free enamel, it was found that the iron under the adherence-oxide free enamel gained more weight during firing than that under the cobalt bearing enamel. Button flow tests of the frits showed, however, that the adherence-oxide free enamel was slightly softer than the other. It is very possible that this increased fluidity of the cobalt-free enamel explains the greater oxidation. Further work is now in progress to see if such is the case.

Some factors affecting the adherence of ceramic coatings to alloys

by J. W. PITTS *and* D. G. MOORE

An investigation was made of several factors that affect the development of adherence between a ceramic coating and a high temperature alloy. Adherence values were obtained with the P.E.I. Adherence Meter after various pre-treatments of the metal and after various coating conditions. Factors studied included the affect of the coating thickness, the roughness of the metal prior to coating, the fineness of grinding of the coating slip, the temperature of firing, the time of firing, and the presence of "adherence oxides".

The coating used for this study was NBS 536 which is a modification of NBS 418 and which normally matures in five months at 1750°F. The alloy was an 18-8 stainless steel, AISI Type 321. Metal pre-treatments included: alkali cleaning, pickling, polishing and sandblasting; also, each of these followed by a slight preoxidation. Roughness of the metal surface after these pre-treatments was determined with a profilometer. In studying the effect of the "adherence oxides" a number of coatings were prepared, each consisting principally of a refractory frit base and one per cent by weight of a different metal oxide.

The results of this study showed the following: (1) the adherence index decreased with increasing thickness of coating and below about 1½ mils, adherence was extremely sensitive to small changes in thickness, (2) with specimens prepared in different ways there was no correlation between surface roughness and adherences, but with specimens prepared in the same way, such as by sandblasting, adherence increased with increasing roughness (3) within limits, adherence decreased with increasing fineness of the slip, (4) best adherence was developed at an optimum firing temperature, (5) the time of firing, above a certain minimum, was not critical, (6) pre-oxidation of the metal usually improved adherence, and (7) one per cent of cupric oxide when added to the coating frit greatly increased the adherence when a coating made from the frit was applied to stainless steel in the "as-received" condition.

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"The Plant Tested Frit"

Evaluation of performance for appliance controls

a three-part article describing techniques and devices for testing control components

Part II

by George C. Pearce • RANGE ENGINEERING SECTION HEAD, FRIGIDAIRE DIVISION, GENERAL MOTORS CORPORATION, DAYTON, OHIO

FOR liquid-filled thermostats, pressure devices (as described in Part I) are not effective. Heat must be applied and cycles are necessarily slower, but problems of ice and antifreeze do not exist.

Figure 4 shows a machine for testing range oven thermostats. The speed is one cycle per minute. Fortunately, this type of thermostat does not require life expectancy over 50,000 cycles, which can be achieved in 35 days. A machine of this speed must run 24 hours a day and 7 days a week to be practical. There are individual counters on each thermostat. If cycling stops, due to either test machine or sample failure, the cycles are counted exactly to that point. It is our practice to use counters wherever possible on tests which run unattended.

It is obvious that all permanent components of these machines must be the very best obtainable; otherwise, the test machine will wear out along with the samples which are on test. Some of the counters, master pressure switches, and valves required almost as much development as the controls under test, and still require constant maintenance.

It has been found useful to check calibration at fixed numbers of cycles on tests of this type. Greatest changes are almost always found in the initial 10% of a run. Once the shape of the curve is known, the drift can almost be projected. Ultimate life is determined either by drift exceeding tolerance for correct operation of the appliance for which control is intended, or by abrupt failure of some part which makes the control inoperative.

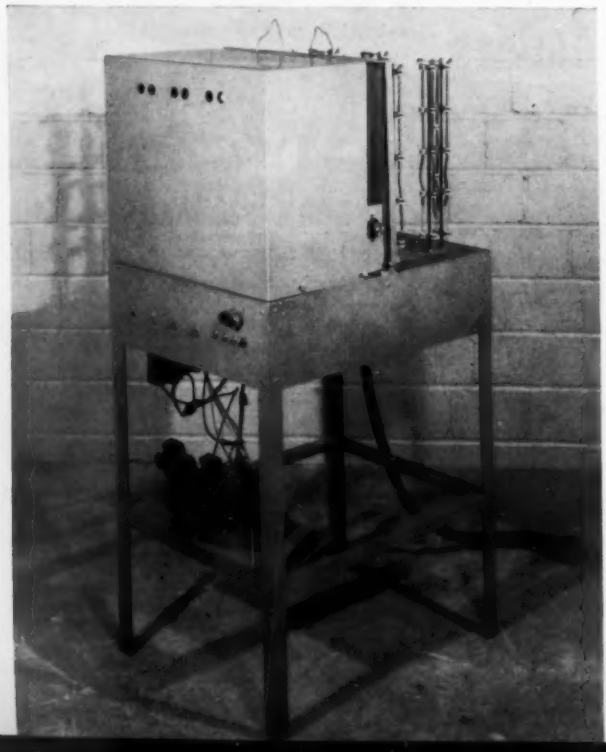


FIGURE 4

Another rather uncommon type of trouble, which is annoying to a customer, is failure of switches due to build-up of internal resistance and consequent overheating. This usually occurs when the amperage is high, the ambient high, and load sustained beyond the point where the control temperature has reached equilibrium. This is the typical heater load, or resistance load. I have seen failures of this type also on air conditioning and commercial refrigeration loads.

A number of years ago we examined a batch of range switches which had failed in service, and a high proportion showed unmistakable evidence of overheating. The amount of power that can be generated at the high resistance point is very large, and many switches were partly consumed by the heat to the extent that analysis was difficult. But to prove our hunch, we resorted to a very simple but effective test. About 20 new samples of the switches were placed in a controlled cabinet at 150°. The contacts are connected in series, using the same size wire and terminals as in the product, and a constant current of about the switch rating is passed through them. To duplicate service conditions, current is fed from a 236-volt circuit and limited by a resistance load external to the oven. A typical arrangement

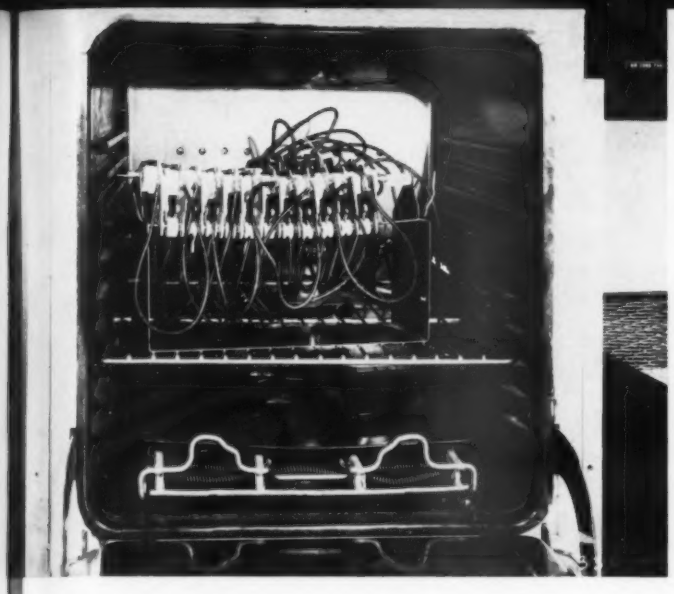


FIGURE 5

is shown in ***Figure 5.***

The external resistance, while consuming a lot of power, has two functions—it stabilizes the current, even though contact resistance changes markedly, and it concentrates a lot of power at a failure which burns the circuit open. This is the method of detecting the fault automatically. Sure enough, our new samples began to develop failures identical to those in the field samples within a few days.

This matter was taken up with our suppliers, and after much work on their part it was decided to try silver plating the switch parts. (The failures were not at the circuit controlling contacts but at permanent terminals and riveted joints.) This simple move raised the cabinet life from days to months. Today we require heavy current switches to stand 6 months in this cabinet. We also test Cook-Master switches, thermostats for ranges and water heaters, over-temperature safety switches for water heaters, air conditioning manual switches, and wiring terminals in this type cabinet.

The ambient temperature of 150° was purely arbitrary to represent our average conditions. For other types of products another temperature might be better. The current is never in excess of the rating of the device and usually not in excess of the maximum in our particular circuit conditions. The only overloading is to series all contacts of a multi-finger switch, while actually they do not all carry equal current. After a few years of practice, it is not difficult to set the current and time limit such that field failures will be eliminated from designs passing the accelerated tests.

Another difficulty of rotary switches is the possibility of flashover, or shorting, due to rapid operation. This is an old problem in the range industry. It was our practice to test all new designs by hand turning—25 revolutions in each direction under load — as fast as possible. We found it necessary to let the switch cool 10 seconds between "shots". We found this method to be very erratic, depending on the tester. Some operators were quicker than others. It was also not possible to get equal speed in both directions. Finally we used a left-handed operator to cross-check a right-handed one.

We solved this dilemma by constructing the machine shown in ***Figure 6.*** The switch under test is driven by a reversible motor and gear train. To prevent overheating, power is applied in short bursts by a cam with a 20 to 1 reduction from the switch shaft. The grounded parts of the switch are connected to the neutral; failures are detected by blown fuses or by ear. The load is the same as used in the product—in this instance a surface unit.

By the use of an oscillograph, we were surprised to find that a fast hand turner could attain an instantaneous speed of 700 rpm, and this machine will attain that speed.

By running hundreds of tests on perhaps a dozen makes of switches, we found that a design that can take 400 rpm on this machine will be O.K. in service. Testing is done on about 15 samples as a group. The speed is increased by steps until failures begin. Generally, one more step of increase and all samples will fail; so the maximum speed is well defined. If one sample fails much below the others, it is carefully examined, and if some peculiar defect is found not likely to occur in production, this sample is discarded.

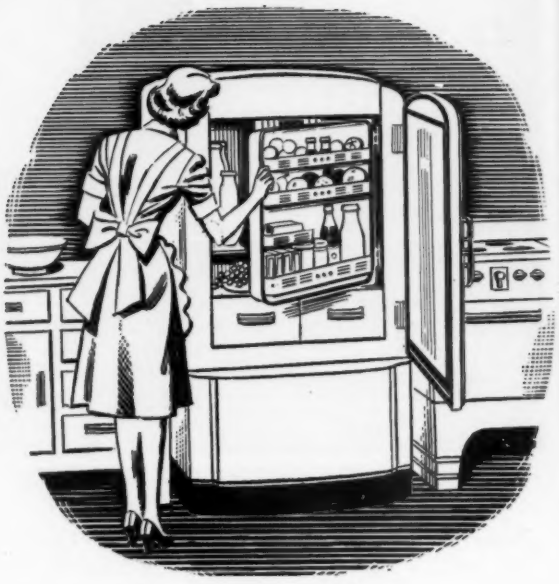
We also use the conventional switch turning, or NEMA-type machine, which is really a mechanical rather than electrical test. We have turned up numerous instances of bearing and, particularly, detent failures of new designs. The real heart of this type of device is the contacts, and we have no trouble with these.

FIGURE 6

The Philco refrigerator

has come a long way

since 1939



... and so has Du Pont DULUX® enamel!

There's a big difference between the Philco refrigerator that sold in 1939 and the streamlined model the Philco Corporation offers today! Fifteen years ago, the Philco "Conservador" was welcomed as one of the most efficient, good-looking home appliances on the market. Over the years, however, the engineering skill of Philco technicians has produced a refrigerator that gives the modern housewife far more convenience and leisure than the 1939 shopper could ever imagine. The popularity of the 1954 Philco, with its 2-way door that opens from either side, left or right, is proof that continued product improvement is vital in maintaining the acceptance of the buying public.

And so it is with America's leading home appliance finish—Du Pont DULUX Enamel! Constant research over the years by Du Pont chemists has resulted in more rugged resistance to chipping, cracking, scratching or staining . . . easier cleanability . . . longer-lasting whiteness than ever before. That's why the DULUX of today meets the most exacting requirements of *today's* topflight appliance manufacturers. E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Delaware.

New 2-way-door Philco opens from either side, left or right

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"DULUX" ENAMEL

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

America's leading home appliance finish

. . . has helped sell over 36,000,000 refrigerators!

Air conditioning, refrigeration industry holds annual meeting

announce publication of the first set of ARI standards

OVER 250 key executives of the commercial refrigeration and air conditioning industry attended the annual meeting of the year-old Air-Conditioning and Refrigeration Institute. The meeting, held at The Greenbrier, White Sulphur Springs, W. Va., March 30 through April 1, was a decided success, stated an ARI spokesman.

It was just a year ago that ARI was formed through a merger of the Refrigeration Equipment Manufacturers Association and the Air Conditioning and Refrigeration Machinery Association.

President's report

In the president's annual report, L. C. McKesson, retiring president, called attention to the rapid progress made by ARI during the past year, and the fact that it now represents over 90% of the total manufacturers goods in the domestic and commercial air conditioning and industrial and commercial refrigeration industry.

Annual reports were also made by James Emmett, Jr., treasurer, and Geo. S. Jones, managing director. Jones referred to the many problems which the rapid growth of the industry has brought about and to the many helpful contacts of ARI with its own members, with code authorities, standards-making groups, public utilities, municipal, state and governmental agencies, and with other trade agencies, and with other trade associations.

A. J. DE FINO, PRESIDENT

W. A. Siegfried, committee chairman, made a report on the highly successful 8th All-Industry Refrigeration and Air Conditioning Exposition held last November, in Cleveland, Ohio (*see December 1954* finish).

Educational conferences

E. M. Flannery, chairman of the ARI Educational Conference Committee reported on the conference held March 11-13 at Long Beach, Calif., and announced that two more educational conferences are scheduled — one at Minneapolis, November 18-20, 1954, and the other in Atlanta, March 17-19, 1955. →

Keynote speech at the ARI annual meeting was Keen Johnson, vice president and public relations director for Reynolds Metals Co., whose subject was "Let's Concentrate on Sales".

Keen Johnson, vice president and public relations director, Reynolds Metals Co., and former governor of Kentucky, delivered the keynote speech. His subject was "Let's Concentrate on Sales."

Elect new officers

A. J. De Fino, vice president, Fedders-Quigan Corp., Buffalo, N.Y., was elected president of ARI. He succeeds L. C. McKesson, vice president in charge of sales, Ansul Chemical Co., Marinette, Wis.

James Emmett, Jr., vice president, Jas. P. Marsh Corp., Skokie, Ill., was elected vice president.

M. M. Lawler, vice president, Worthington Corp., Harrison, N. J., was elected treasurer.

Board of directors

The following were elected to the board of directors:

W. H. Aubrey, Frick Co.; W. F. Bakke, Sub-Zero Freezer Co., Inc.; F. G. Coggin, Detroit Controls Corp.; A. J. De Fino, Fedders-Quigan Corp.; J. A. Dugan, Bundy Tubing Co.; E. B. Dunphy, Acme Industries, Inc.; James Emmett, Jr., Jas. P. Marsh Corp.; C. V. Gary, Henry Valve Co.; Walter A. Grant, Carrier Corp.; B. W. Hanson, Schaefer, Inc.; J. R. Hertzler, York Corp.; H. F. Hildreth, Westinghouse Electric Corp.; R. H. Israel, Virginia Smelting Co.; G. K. Iwashita, General Electric Co.; L. W. Larsen, Tecumseh Products Co.; W. F. Switzer Frigidaire Division, General Motors Corp.; M. M. Lawler, Worthington Corp.; H. F. Spoehrer, Sporlan Valve Co.; and A. O. Vogel, The Vilter Manufacturing Co.

Caught in a happy mood at an informal meeting of ARI officials are, left to right: L. C. McKesson, past president; James Emmett Jr., vice president; Geo. S. Jones, Jr., managing director; and A. J. DeFino, newly-elected president.

Advisory board members

Advisory members of the ARI board of directors, made up of past presidents are: John E. Dube, Alco Valve Co.; E. M. Flannery, The Bush Manufacturing Co.; S. E. Lauer, York Corp.; R. H. Luscombe, Penn Controls, Inc.; A. P. Shanklin, Carrier Corp.; W. A. Siegfried, Superior Valve & Fittings Co.; and K. B. Thorndike, Detroit Controls Corp.

The above-named, plus L. C. McKesson, retiring president, and Geo. S. Jones, Jr., managing director, will constitute the official board of directors of ARI for the fiscal year beginning May 1.

ARI Standards published

Publication of the first set of ARI Standards was announced by the Air-Conditioning and Refrigeration Institute.

This edition includes thirty-one individual standards covering a wide range of air conditioning and refrigeration products.

Of particular interest is tentative Standard 6-10, "Application Engineering Standard for Year-Round Residential Air Conditioning," which includes the Institute's recommendations for calculating residential cooling loads. Other standards cover:

room air-conditioners,
self-contained air-conditioners,
compressors and condensing units,
heat transfer products, and
central-station air-conditioning and refrigeration equipment.

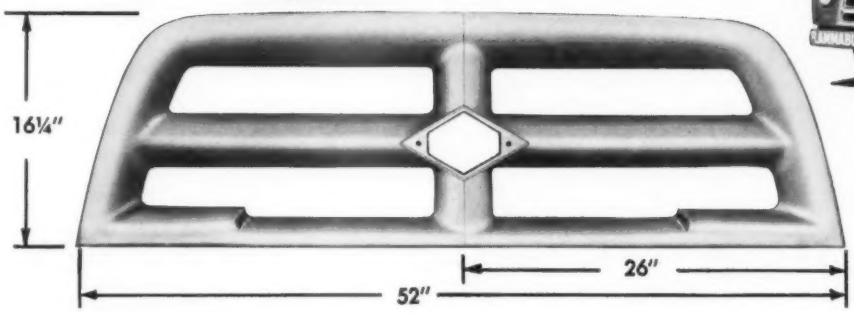
While the newly-published standards are the first to bear the ARI name, most are revised editions of standards previously published by ACRMA and REMA, predecessors of ARI.

The Institute is carrying on an extensive standardization program and will publish new standards, as well as revisions of existing standards, from time to time to meet the needs of the growing and expanding air-conditioning and refrigeration industry.

Copies of the price lists for the ARI Standards are available from the Institute's headquarters at 1346 Connecticut Avenue, N. W., Washington 6, D. C.

ACME *Engineered* ALUMINUM & MAGNESIUM CASTINGS

An aluminum grille engineered and manufactured for the Diamond T Motor Car Company.



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Maximum color values are obtained, and with a high degree of stability, with this new titanium frit produced by Ferro's famed "flake" process. Naturally, a new formula has been developed. But of equal importance, the high standard of uniformity maintained on this flake frit makes possible higher production in the shop, fewer rejects in the finished ware.

Ferro's new "1700" frit has a wide firing range, and produces a high-gloss finish free from roughness or surface imperfections. It also has the proper coefficient of thermal expansion Porcelain enamels need for such applications as ranges, laundry equipment, refrigerators and other appliances. In adhesion and thermal properties it compares favorably with *white* titanium Porcelain enamels.

No tricks are required to use Ferro's "1700". You'll find it as simple to use as a white titanium frit—needing only a minimum of "fitting" or manipulation to work it into your present shop practices.

We would like to tell you more about it. Better yet, we'd like to *show* you how well it works. Why not send us a color sample you would like to produce; then let us come down and help you produce it.

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Porcelain Enamel Division

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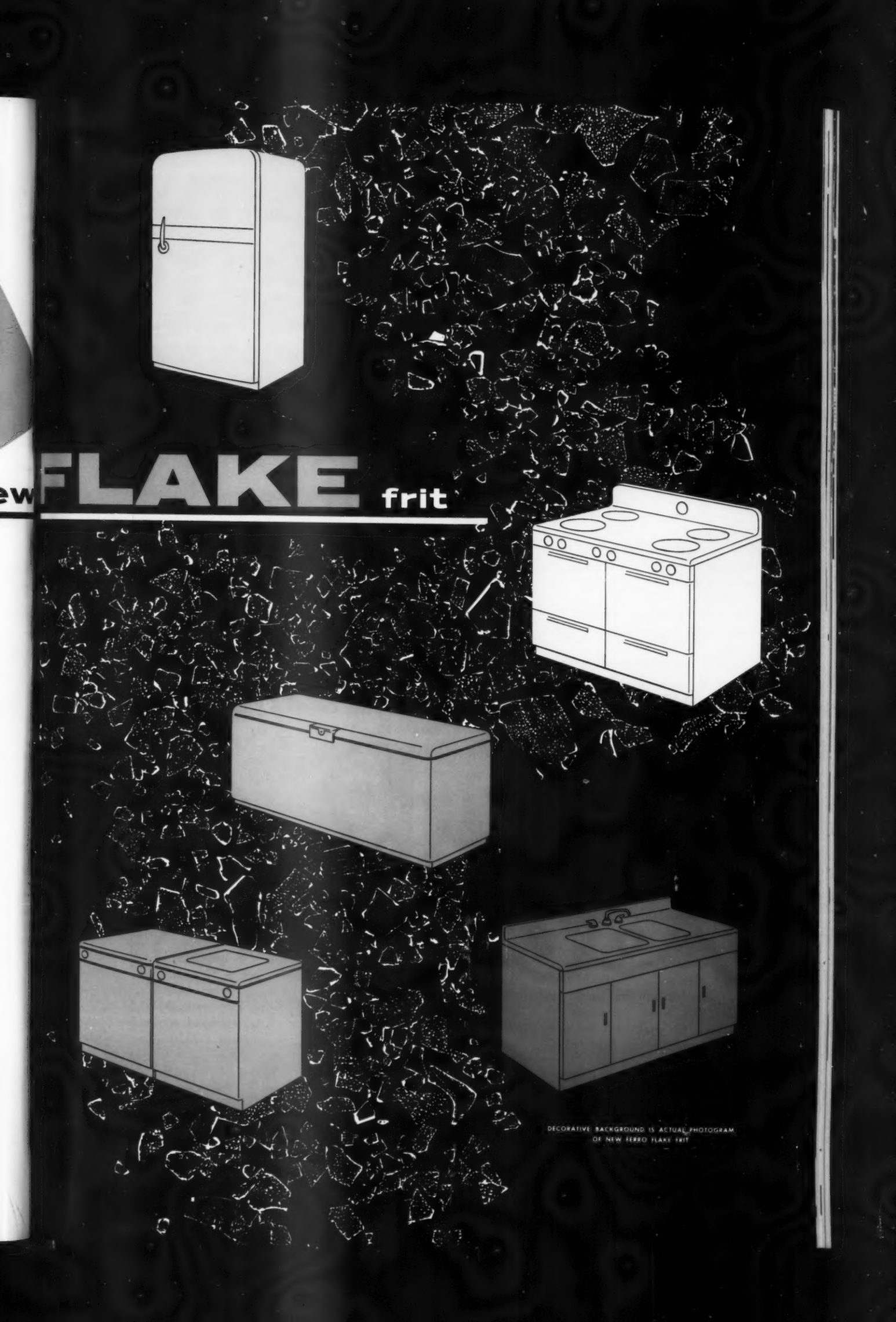
ew FLAKE frit
DECORATIVE BACKGROUND IS ACTUAL PHOTOGRAM
OF NEW FERRO FLAKE FRIT

Enamelers' clubs meet—eastern, west coast, midwest

use of color in kitchen discussed by Eastern group

"COLOR is Here . . . Don't Be Caught Short" was the theme of the March 6 meeting of the Eastern Enamelers Club, in Philadelphia.

Guest speaker was Charlotte Eaton Conway, appliance editor of *House Beautiful*, who told the enamelers that "modern design calls for a warm, cozy, friendly kitchen . . . The antiseptic, operating room look no longer serves."

The demand for color in appliances is coming from consumers, and has not been created by "names", publicity, designers or anything commercial, stated Mrs. Conway, adding that smart observers have reported and interpreted this new trend, not created it.

Because of various factors, the family today is spending more time at home and the housewife is making the kitchen her headquarters more and more. Therefore she (the housewife) intends to make her kitchen a show room with more color and beauty in it, stated Mrs. Conway.

"Kitchens of Tomorrow"—as seen in various consumer publications—featuring open construction, natural woods, stainless steel built-in refrigerators, etc., may be beyond the means of a volume market, but they are the pace setters and it will be but a short time before the average housewife will be asking for more beauty within her means, concluded Mrs. Conway.

Floyd Williams, Pemco Corporation ceramic engineer specializing in production of colored enamels, then covered a few points on titanium dioxide opacified colors.

Although colored enamels are more difficult to handle than white titanium enamels, the problems are not insurmountable, stated Williams. The precautions taken are actually nothing more than a more rigid application of good control practices.

Williams then commented on different types of colored enamels: *opaque frits* — reflectance greater than 75%, with a good range of colors; *semi-opaque*—reflectance less than 75%, but colors are more stable and use less oxide; *smelted in colors* — must be ground finer to blend in frit particles, and requires rigid quality control measures.

For a report of a presentation by Dana Chase, editor of *finish*, turn to page 44.

discussions on design for enameling, welding and corrosion-resistance draw record attendance at Pacific Coast meeting

SEVENTY-FIVE members and guests established an all-time high in attendance at the March 17 meeting of the Pacific Coast Enamelers Club, held in Los Angeles. This is evidence that the "pepped up" 1954 program, sponsored by Glen Fulton, club president, is beginning to pay dividends.

Program quality kept pace with the attendance. It was sparked by a lively panel discussion of design and welding problems as they pertain to the porcelain enameling industry.

W. T. Graham, of Norris-Thermador Corp., opened the panel discussion with a talk on design for enameling. He pointed out that while utmost product utility governed all design, the design must not conflict with various production practices. The product must be designed so that it can be easily cleaned, will support itself during heat treatment and enamel application, and so that stresses involved during ultimate use of the product will never exceed the metal's yield point.

W. T. GRAHAM

DICK KILGORE

Graham stressed the expanding use of porcelain enamel as a corrosion preventative, and of the design problems involved in producing such huge implements as beer vats, tanks, etc. He emphasized the importance of avoiding designs that could not be effectively enameled. "When such designs are released for use, then subsequently fail, it is a black-eye to the entire enameling industry," Graham said.

Graham wound up his talk by stressing the importance of good shop practices in conjunction with design. "The best of designs are due to fail without full shop cooperation."

Dick Kilgore, of Lincoln Electric Co., then discussed welding problems in conjunction with effective enameling. "When enameling over welds, the fault most commonly met with is many small pinholes along the weld area," Kilgore said. "These pinholes are caused by the entrapment of atomic hydrogen in the metal during the welding process. Later, reformed into molecular hydrogen, this gas escapes and causes the pinholes."

Kilgore pointed out that low hydrogen welding rods are now available which minimize this hydrogen entrapment. "The secret of these low hydrogen welding rods is low moisture content," he said. "The flux on the ordinary welding rod contains

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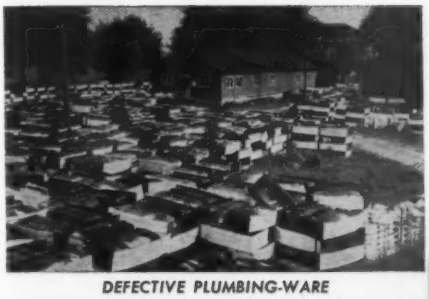

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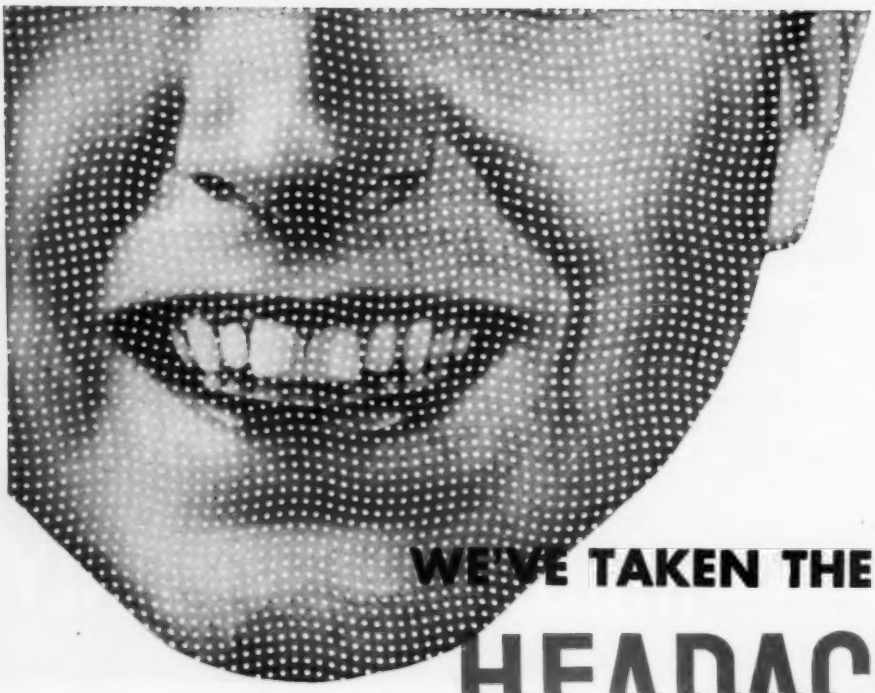

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Provides a Superior Pre-Paint, Corrosion-Resistant Surface

If phosphatizing has been a constant source of trouble in your plant, you ought to know more about Fosbond! Pennsalt created this brand-new process with one idea in mind: that it should provide a first-rate paint-bond surface and be dependably trouble-free in operation. Frankly, we succeeded—and here's why:

The Fosbond Process comprises an *integrated*, thoroughly *compatible* series of products and operations for the phosphatizing of metal prior to organic finishing. On any new installation, Pennsalt metal-finishing specialists analyze the customer's operation, then specify the proper Fosbond materials and how they should be used. These men get the Process running smoothly and help *keep* it that way by making regular plant checks.

Like To See Test Panels?

We'll gladly send you a set of Fosbonded test panels, or Fosbond chemicals with which you can prepare your own panels. Just tell us 1) type metal to be phosphatized, 2) phosphate coating now used, 3) method of application, 4) organic finish used, 5) standards finish must meet.

Or, give us details about your operation, and we shall answer your questions about Fosbond as specifically as possible. Write: Customer Service Dept., Pennsylvania Salt Mfg. Co., 510 Widener Bldg., Phila. 7, Pa.

A Mighty Important Extra!

Guaranteed by Good Housekeeping

Fosbond has qualified for the *Good Housekeeping* Guaranty Seal, a part of the colorful Fosbond emblem. Authorized Fosbond users can incorporate this emblem into their sales literature, product tags, etc., thus benefit from a proved merchandising device!

FOSBOND

Fosbond is a Pennsalt trade mark

A better start for your finish

Pennsalt Chemicals

Metal stampers discuss safety, welding, plastic dies, materials handling

illustrated with finishfotos

THE Pressed Metal Institute presented an excellent series of panel discussions on subjects of interest to metal stampers at the PMI 5th annual Spring Technical Meeting, held March 17-19, at the Carter Hotel, Cleveland, Ohio.

Considered by many in attendance as being one of the best programs ever presented for members of the metal stamping industry, the 1954 meeting drew attendance from various sections of the country, including the West Coast, as well as from Canada and England.

General program chairman was James L. Chase, of E. W. Bliss Co. Members of the program committee included Frank Humberger, of Technical Metal Processing, Inc.; Frank Schmidt, of Jackson Metal Products Co.; and Philip C. Wood, of Acklin Stamping Co.

The panel-type program included discussions on "Safety in a Stamping Plant", "Power Press Problems", "In-Process Material Handling", "Resistance Welding—Design, Application and Production", and "Use of Plastic Dies".

In addition to the technical sessions, three luncheon speakers also discussed matters of special interest to management personnel.

Human relations in safety

R. T. Halbert, of Liberty Mutual Insurance Co. and luncheon speaker on the first day, spoke on "Human Relations in Safety". He pointed out that 85% of accidents are due to "human factors" directly caused by what the individual did and did not do. Too often management has neglected to deal with people as individuals, stated Halbert, who urged that "we must match physical abilities of the man to the physical requirements of the job."

Halbert cited a survey by the National Society of Professional Engineers which covered companies employing a combined total of 3,000,000 people. The survey showed that 56% of the companies had no formal safety training program whatsoever. He urged that companies in the metal stamping industry, especially, adopt some kind of a training program.

Three sales "bogeymen"

C. T. Burg, vice president of sales, Iron Fireman Mfg. Co., was luncheon speaker on the second day. During his address he told the metal stampers to "Beware the Three Bogeymen" who have an adverse effect on sales, namely "inertia", "pessimism" and "delay."

While this country's economy was bogged down during the depression of the 1930's, Burg related how his company increased sales each year during the depths of the depression by avoiding the three bogeymen. He pointed out how Iron Fireman salesmen avoided "inertia" by such activity as ringing doorbells and demonstrating their products. They countered "pessimism" and "delay" with optimism and by immediate and continued action to sell prospective buyers.

Burg concluded that the motto of their sales force is "They buy, or they die."

Promotion to management

Robert J. Trundle, president of Trundle Engineering Co. and luncheon speaker on the third day, discussed "Transition to Boss".

Pointing out the importance of the right type of management personnel, Trundle cited a survey which showed that more than 88% of business failures are due to managerial and organizational deficiencies.

All companies need a plan of procedure, and the first step is to decide what's better than we now have, then get a clearly defined target, establish where it is, and how to hit it. Trundel also ventured that a good organization is not necessarily a harmonious one.

In the absence of Samuel P. Hull,

Luncheon speaker C. T. Burg, vice president of sales, Iron Fireman Mfg. Co., told the metal stampers how to counteract "Three Bad Bogeymen" in selling.

Panel on "Progress in the Use of Plastic Dies — Left to right: Edsel Ruddiman, Robert Voss, George M. Rice, Fred Lyijynen, R. W. Breckenridge (PMI staff), J. F. O'Reilly, and John B. Kendall (moderator).

PMI president and vice president of Worcester Stamped Metal Co., Robert Breckenridge, new PMI technical director, opened the spring technical sessions.

SAFETY IN A STAMPING PLANT

Moderator for the panel on safety was C. Glenwood Rose, president of Judson & Rose, Inc., and chairman of the PMI Safety Committee.

In commenting on "Safetistics", the first annual report of accident frequency and severity rates for PMI membership, Rose brought out several interesting points from the survey. "One is that it proves conclusively that the smaller companies have the highest accident rates. The larger companies seem to have the problem under much better control," stated Rose.

It was also announced that an award for companies doing the best job in improving their safety set-up will be effected at the PMI national convention next fall.

Stanley Works safety film

A feature of the program was "The Safety Story at Stanley", with narration by Lowell Thomas. It was brought out that the 101-year-old Stanley Works feels that safety is as important to top management as sales, quality control or production. Moreover, the president of the company regularly sits in on safety meetings. Al Schaffrick, of Stanley, then answered questions pertaining to points brought up in the showing of the film.

Panel on "Safety" — Left to right: Al Schaffrick, C. Glenwood Rose (moderator), and Dan Farrell.

Panel on "Welding" — Left to right: J. J. MacKinney, S. C. Rockafellow, and I. Morrison (moderator). W. A. Stanley, also on the panel, is not shown.

Panel on "Power Press Problems" — Left to right: L. S. Madden, R. H. Luckenbach, J. M. Transue, and G. E. Deming, Jr. (moderator).

U.S. Steel reports

Dan Farrell, director of safety, United States Steel Corp., followed with an illustrated talk in which he pointed out how his company has reduced lost-time accidents over the years, down to a frequency of 1.96 and a severity of .75 in its steel producing divisions. Moreover, he showed that the higher the production at U.S. Steel, the better the safety record.

Three important points in any safety program, as pointed out by Farrell, are: (1) keep safety people on the move and not at "desk work"; (2) keep safety men in on high level management meetings; and (3) keep fighting to impress on top management the necessity of a good safety program.

POWER PRESS PROBLEMS

George E. Deming, Jr., assistant personnel director, Heintz Mfg. Co., acted as moderator for the panel on "Power Press Problems."

This panel included Leland S. Madden, safety director for Heintz; Robert H. Luckenbach, safety director, The Budd Company; and J. M. Transue, security director, Philco Corporation.

Madden discussed a press shop indoctrination program inaugurated at Heintz after World War II. The program was first for foremen, then for all new employees, and then for those transferred to the press department. The indoctrination took only about one and one-half hours of an employee's time.

He emphasized the necessity of talking to the press operators in shop language and let them know that the safety devices and regulations are for

Panel on "In-Process Material Handling"—Left to right: R. A. Barth, P. F. Youngdahl, A. J. D'Vileskis, E. V. Crane, Dr. A. T. Gaudreau (moderator), R. W. Breckenridge (PMI staff), and J. L. Chase (chairman of spring technical meeting).

their benefit, and that credit for safety goes to the men themselves. The Heintz program has reduced their accident frequency rate from 12.4 in 1948 to 2.3 in 1953, and 1.6 for the first few months of 1954.

Preventive maintenance

Luckenbach pointed out the necessity of proper press maintenance which must be "up to snuff" all the time.

"Preventive maintenance must be organized on a very careful basis, analysis of the conditions. Every time a safety guard fails, why? On account of a man who did not do the job he should have done? Keep records, records, records," emphasized Luckenbach.

Speaking of press mechanization, he pointed out that if a man is taken off the back of the press, 50% of the hazard is gone. However, there is not quite enough attention being paid to the front end of the press, said Luckenbach, who said that here die designers could play a big part in designing safety into press work.

"No hands off policy"

Transue explained Philco's "No Hands off Policy" which could be defined as just keeping employees away from the point of operation of not only small presses but large presses, because for an operator to lose a hand or fingers "they have got to be in there in the wrong place at the right time, or the right time at the wrong place."

There are two ways of keeping a press operator's hands out of the danger zone. One is to tell him and the other is to stop him, and a combination of the two is the logical way of doing it.

Mechanical guard does the job at Philco

Transue then described a mechanical guard which Philco manufactures. "We think it is pretty good, because it does what we want it to do—it brings the hand out if it is in there." It is a ram-actuated guard, and it is a 100% guard "because when the top comes down, the ram comes down, and when the ram comes down with that die, either by design or accident, your hand is swept out of the danger zone," stated Transue.

IN-PROCESS MATERIAL HANDLING

Dr. A. T. Gaudreau, of Gaudreau, Rimbach & Associates, was moderator for the panel on "In-Process Material Handling."

A definition of "material handling" was given by Gaudreau as follows: "It covers all transportation and movement of material from the time it enters the plant until it leaves." He estimated that there is 50 tons of handling for each ton shipped.

Paul F. Youngdahl, of Mechanical Handling Systems, Inc., presented an illustrated talk on the use of conveyors in the plant of a leading producer of home appliances.

A. J. D'Vileskis, factory manager, Columbia Metal Stamping Co., followed with a report on "Finished Parts Handling", emphasizing the necessity of keeping a plant in a clean and orderly manner.

R. A. Barth, general superintendent, and A. J. Gerlach, research and development engineer, both of The Barth Corp., collaborated in the presentation of a film on how their company utilizes highly complex materials handling equipment in the production of fragile items such as light bulbs.

RESISTANCE WELDING

Moderator for the panel on "Resistance Welding—Design, Application and Production" was I. Morrison, vice president, Morrison Steel Products, Inc. Speakers included

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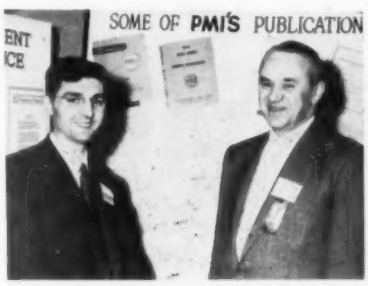

R. W. Breckenridge (right), PMI technical director, and R. H. Wright, of Cowley, England.

H. A. Daschner (left), PMI asst. mgr., greets H. P. Hopp, chm. new greater New York district.

More than a dozen firms had exhibits. In the Federal Machine & Welder booth are Don Frang and F. W. Schmidt, of Jackson Metal, F. A. Bodenheim and R. D. McCreery, of Federal Machine; and Vincent Reed, of Weltronic.

STUDEBAKER

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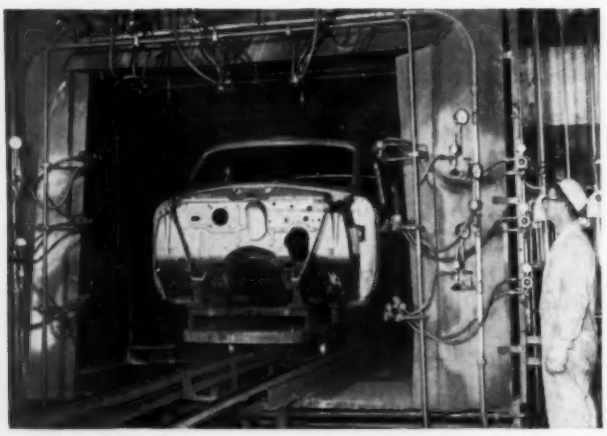

Automatic electrostatic spray enables Studebaker to apply a heavier and more uniform primer surfacer while giving them a net saving of 1.81 per body in paint and direct labor. Not only is the Ransburg method providing the desirable increase in uniform film thickness, but it is enabling Studebaker to paint more bodies per hour with the substantial savings in paint and labor over the former hand spray method.

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Resin bonded chemical treatments— "wash primers" for metal surfaces

by M. D. Phelps • SPECIALTY COATINGS, INC., DIVISION OF THOMPSON & COMPANY, OAKMONT, PA.

I WOULD like to start by quoting from the writings of my colleague Harold Rosenbloom who said a number of years ago that for almost forty years the basic approach to the preparation of metals for painting has remained static. That approach, refined and elaborated over the years, has been the deposition on the metal surface of an adherent corrosion inhibitive inorganic coating. Here, of course, he was speaking of the use of phosphoric acid and the subsequent refinements in the use of phosphoric acid and the metallic phosphates. The development of resin-bonded chemical treatments for metal surfaces introduces the ability to combine in one step the deposition of an adherent, corrosion inhibitive inorganic coating on metal surface with the simultaneous formation of a protective primer-type organic film.

Early history of "wash primers"

These resin bonded chemical treatments are identified popularly by the term "*wash primer*," which is very definitely a misnomer arising out of its development history. At the risk of traveling a well worn path I would like to go back and very briefly tell you something of the way these wash primers came about.

During World War II shipyards around the world were operating under extreme pressures to dry dock ships, recondition and repaint the hulls and get them back in the water. The high cost of dry docking and the inexpediency of keeping ships out of commission for an extended period of time brought on a concerted effort to improve the methods formerly used for preparing and painting ship hulls. Normal procedure was to wet sand-blast the bottom down to bright metal and then apply a *phosphoric acid wash*. The phosphoric acid was naturally subject to freezing in the winter time, it deposited a somewhat uneven and sometimes very loose deposit of phosphate on the metal, and it has to be painted over almost immediately so that it would not be spoiled by rain or deteriorated by high humidity conditions which naturally exist in a dry dock. Thus, a program was started under contract between the National Defense Research Committee and the Bakelite Company to improve upon this system. This work was headed up by L. R. Whiting, of Bakelite.

M. D. PHELPS

In the evolution of the wash primer as we know it today, one of the first steps was to introduce alcohol into the phosphoric acid system so as to prevent it from freezing in cold weather. Then, a binder was needed to provide a more uniform, more closely knit phosphate deposit. In searching for such a binder, polyvinyl butyral was selected because it was alcohol-soluble and its solutions would tolerate a considerable quantity of water.

Thus, having a clear coating containing phosphoric acid, the next step was to endeavor to incorporate into this system an inhibitive pigment. The normal zinc chromate pigments turned out to be unsatisfactory since they had a very high content of water soluble matter which seriously detracted from performance. A search was instigated and zinc tetroxy chromate was found to be a very excellent inhibitive pigment for this system.

Hence, the three principal components of wash primer were arrived at, these being phosphoric acid, vinyl butyral resin and a special type of zinc chromate pigment. This sounds like a very simple development, but most things seem simple in retrospect. Actually, a vast number of experiments were conducted over a period of several years to arrive at the most suitable ingredients and the proper proportions among them. It was a highly successful development and was put into use by the Navy.

At the end of the war, the development project was de-classified and the information was then available through Bakelite to industry. Industry immediately began to study the chemistry of wash primers and then to further develop their usefulness to a point where today they plan an important part in the coatings field.

Four basic types

The four basic types of wash prim-

ers actually in commercial usage today are the zinc chromate type, the lead chromate type, the chromic phosphate pigment type, and the chromic phosphate complex type.

The *zinc chromate* type is typified by the original WP-1 formulation and the present Federal Specification MIL-C-15328A. This is a double compartment on two-package system consisting of a resin base and an acid diluent or activator. The activator is added to the base just prior to use. The resultant mixture must be used within eight hours, since it will spoil after that period of time. The proportions of acid diluent and resin base must be maintained within fairly close limits in order to gain maximum benefits from the use of this material. It is probably the most widely used type today in spite of the fact that it has the draw-back of being a double compartment system. The fact that it has limited stability after mixing precludes its use in dip tanks and flow coating reservoirs, but it is very easy to handle and apply in spraying, brushing and roller coating applications.

The next development was the *lead chromate type* and it is based on the same basic type of system except that the pigment used is a special insoluble grade of lead chromate. Although this type has been known for some time it has not been widely adopted by the coatings industry because it had some inherent draw-backs, as it was originally developed, and a considerable amount of work was required to eliminate these kinks. It is preactivated. That is, the acid diluent is added to it in the course of manufacture, and the complete formula remains indefinitely stable in the package. It has the limitation of being suitable for use only on ferrous surfaces. The original formulations had the draw-back of being very sensitive to application conditions of high atmospheric humidity. The formulation is critical and must be properly balanced in order to eliminate the severe tendency to blush when applied at high humidities and thus fail to develop adhesion. That these problems have been overcome is demonstrated by the fact that this type is commercially successful today. Proper formulations have been in use for over four years in dip tanks, even when applied at widely varying atmospheric conditions.

FERROUS — All Three Types

Exposure	Comparison
Normal atmospheric	All are comparable
Salt environment	Lead chromate, Zinc chromate } comparable Chromic phosphate — inferior
Water immersion and High humidity	Lead chromate — best Chromic phosphate — close 2nd Zinc chromate — close 3rd

NON-FERROUS — Zinc Chromate and Chromic Phosphates Types

Exposure	Comparison	
	Aluminum	Zinc
Normal atmospheric	Both comparable	Both comparable
Salt environment	Zinc chromate slightly better	Zinc chromate slightly better
Water immersion and High humidity	Both comparable	Chromic phosphate slightly better

The *chromic phosphate complex type* and the *chromic phosphate pigment type* are more recent developments. The chromic phosphate complex type is made by reacting chromic acid and phosphoric acid with vinyl butyral resin to obtain a transparent green solution. It can be used in its clear form or can be pigmented with zinc chromate or lead chromate. In the clear form it develops very good adhesion on air drying, but does not offer maximum corrosion protection. The chromic phosphate pigment type is made in much the same manner as the zinc chromate and lead chromate types. The pigmentation, however, consists of a special chromic phosphate pigment used either along or in combination with zinc tetroxy chromate. Both of these types are stable single package materials and are suitable for use on both ferrous and non-ferrous metals. It is thought that the pigmented chromic phosphate complex type and the chromic phosphate pigment type are comparable in performance, although the exposures are not of sufficient duration to definitely support this conclusion.

Where to use each primer

Now let's compare these various types of wash primers with regard to their use on various types of metal surfaces and under exposure to different types of conditions. For the sake of simplicity, we will lump together the two chromic phosphate types as one species.

First let's look at ferrous metal surfaces. Here we consider all three of these general types. (See Table)

Extensive tests have shown that the zinc chromate type and the lead chromate type give comparable results in normal and salt atmosphere, but the lead chromate type shows definite superiority in very humid or in fresh water environments. The chromic phosphate type is slightly inferior to the lead chromate type in conditions of high humidity. It is definitely inferior in salt atmospheres, but it is equal to the others in resisting weathering in ordinary atmospheres.

When we consider non-ferrous surfaces such as aluminum and galvanized steel, only the zinc chromate and chromic phosphate types are useful. On aluminum, these two are about equal on high humidity exposures. The zinc chromate type is slightly superior in salt atmospheres and they are about equal when exposed to normal atmospheric weathering. On

to Page 84 →

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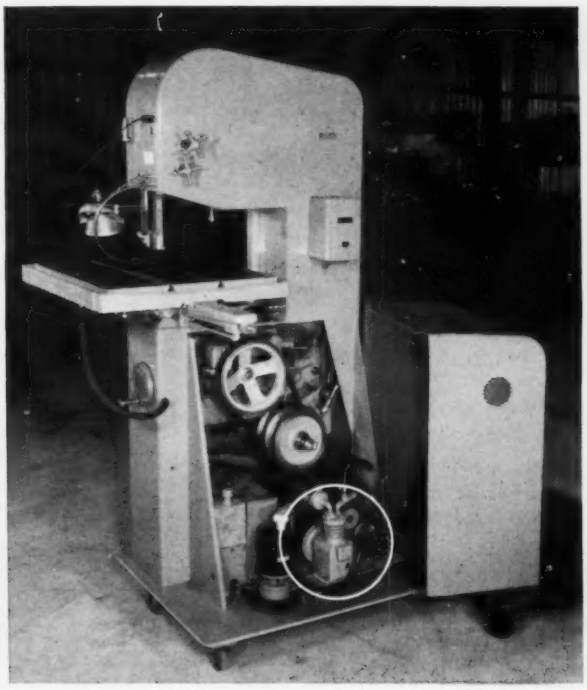

2. COMPONENT PARTS — *DeVilbiss Air Compressors supply pressure that forces a jet of air and coolant against the saw blades in DoAll Band Machines.*

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Says DoAll's Clinton Rosene, "We give our customers quality throughout the machine – that's why we selected DeVilbiss equipment. DeVilbiss Air Compressors give dependable service with little or no attention. Our DeVilbiss spray-painting equipment assures attractive, long-lasting finishes."

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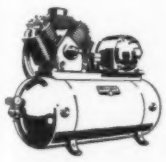
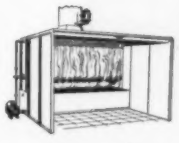


Air Compressors

Hose and Connections

Spray Guns



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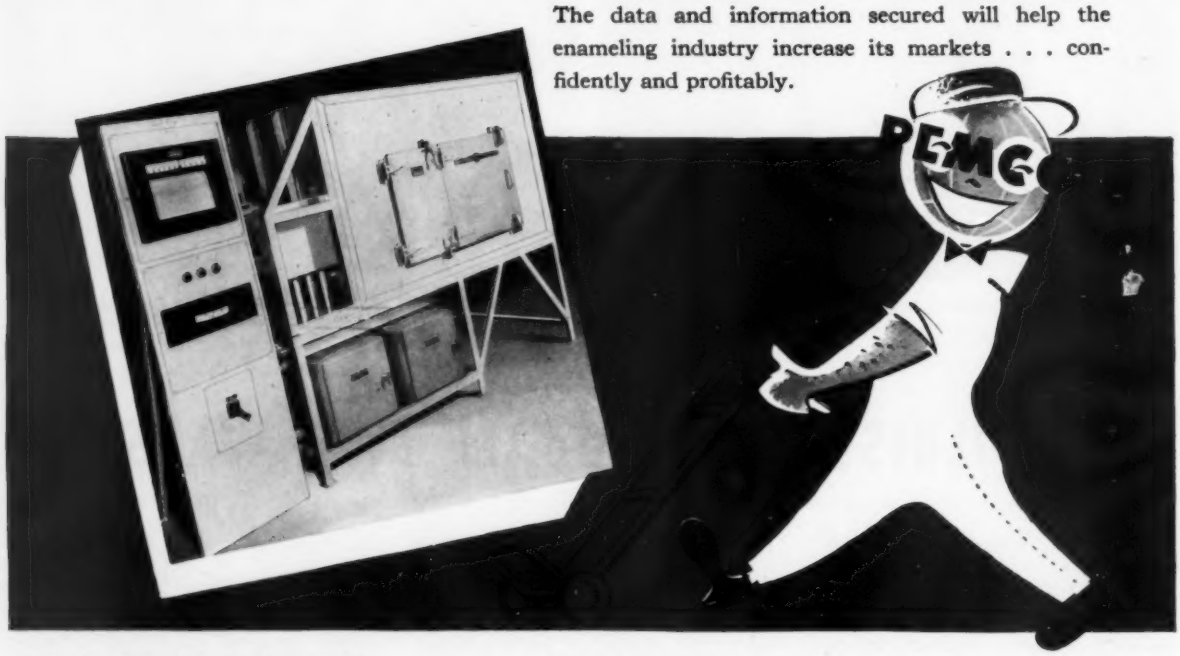

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Pemco Corp[illegible], Maryland

WARNER RETIRES FROM CROSLEY

Frank Warner, since 1944 director of purchases for the Crosley Division, Avco Mfg. Corp., has retired. He plans to make his home in North Miami Beach, Florida.

REMINGTON APPOINTS BARTLETT, REISS AS PROJECT ENGINEERS

In connection with design, research, and new product development in the room air conditioner field, Walter Schmidt, director of engineering, Remington Corp., Auburn, N.Y., has announced the appointments of Robert D. Bartlett and Andrew Reiss as project engineers.

Bartlett was formerly chief engineer in charge of refrigerated equipment for Ace Cabinet Corp., and assistant plant manager and chief engineer of refrigerated cabinet division of Anheuser-Busch. Reiss was formerly chief engineer of the Morrison Steel Products, Inc., and chief design engineer for Fedders-Quigan Corp.

RANNEY REFRIGERATOR ELECTS REES PRESIDENT

Ranney Refrigerator Co., Greenville, Mich., has announced the election of Gregory L. Rees as president and chief executive officer. It was stated that Ranney plans to expand operations under the direction of Rees, who formerly was president of The Coolerator Co., Duluth, Minn.

MOORE TO HEAD ENGINEERING FOR AMANA REFRIGERATION

Appointment of Robert E. Moore as director of engineering for Amana

Refrigeration, Inc., Amana, Iowa, was announced by George Foerstner, executive vice president. Formerly chief freezer cabinet designer, Moore will now direct design of Amana freezers and room air conditioners.

Amana's new engineering director holds 20 patents in the fields of refrigeration and electronics, and is co-author of the book "Materials and Processes in the Electrical Industry."

MOUNTAIN STATE FABRICATING TO MAKE HOT OIL HEATER

Mountain State Fabricating Co., Clarksburg, W. Va., has acquired manufacturing and marketing rights for a new hot oil heater, a non-pressure, liquid generator of process heat in industry.

R. Casper Swaney, who developed the unit, has joined the company as manager of the hot oil heater division which will engineer, manufacture, sell and service the firm's expanding line of heating units ranging from 30,000 to 150,000 Btu per hour.

CONSOLIDATE JANITROL DEPARTMENTS IN COLUMBUS

Frank H. Adams, president of Surface Combustion Corp., Toledo, has announced the consolidation of executive and sales departments of the Janitrol Division with manufacturing and engineering units in Columbus, Ohio.

Heading up all Columbus operations as general manager is Robin A. Bell. Harry C. Gurney is sales manager. Fred J. Potter is plant manager, and John I. Trimble is head of engineering.

The company has three plants in Columbus, one for Janitrol space heating and cooling equipment, another for gas turbine components and heating equipment for military equipment and commercial aircraft, and a third for Kathabar air conditioning and dehumidifying products.

GAS APPLIANCE MANUFACTURERS MEETING, MAY 19-21

The 19th annual meeting of the Gas Appliance Manufacturers Association will be held at the Drake Hotel, Chicago, May 19-21.

Keyed to the theme "Programmed Action for Profit," the meeting will feature three general sessions, two meetings of the directors, the annual convention dinner, and the president's dinner at which awards will be presented to delegates for "meritorious service to the industry."

Sheldon Coleman, GAMA president, states that among matters to be considered by the board at its first session is a proposal of the Gas House Heating and Air Conditioning Equipment Division to divide itself

into four separate divisions—furnace, boiler, conversion burner, and recessed heater and floor furnace. Harold C. Day, division chairman, reports that members voted overwhelmingly in favor of the change in a recent mail poll.

Division and group meetings are scheduled for morning and afternoon throughout the convention.

MULLINS PRODUCTION APPTS. AT LIBERTY PLANT

L. C. Sassmanhausen has been named works manager of Mullins Manufacturing Corp.'s Liberty plant, Warren, Ohio, it was announced by H. O. Smith, general manager of operations. Sassmanhausen formerly operated his own tool and die shop in Detroit.

Earl Scott, former production planning chief at Liberty, is now assistant works manager. Ralph Knepper has been moved from head of production planning at Plant 3, Salem, Ohio, to Scott's former position. Bruce Riley took over Knepper's former duties.

The 5,000,000th post-war laundry appliance *— produced by Whirlpool Corp. — came down the assembly line March 19. The event was commemorated by Donald W. Alexander, vice president; Andrew Ehrhardt, quality control manager; P. Eduard Geldhof, vice president; and John M. Crouse, sales manager. The machine shown is an Imperial automatic washer.*

RCA ESTATE NAMES SMITH SALES VICE PRESIDENT

Appointment of Inwood Smith to the new position of vice president of sales, RCA Estate Appliance Corp., was announced by Cecil M. Dunn, president. "Creation of the new post in our merchandising department," stated Dunn, "is designed to fulfill

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our needs for long-range planning of production and sales for the company's line of electric and gas ranges."

Dunn said that RCA Estate has completed the first phase of a modernization program at Hamilton, Ohio. The plant has been completely remodeled and equipment and other facilities added, which approximately triple the plant's productive capacity.

NASH-KELVINATOR ORGANIZES SPECIAL RESEARCH STAFF

Organization of a special research staff and important appliance engineering staff advancements has been announced by George W. Mason, chairman and president, Nash-Kelvinator Corp., Detroit. The moves were said to be part of the firm's program

DR. LAWRENCE A. PHILIPP

DR. WILLIAM MIKULAS

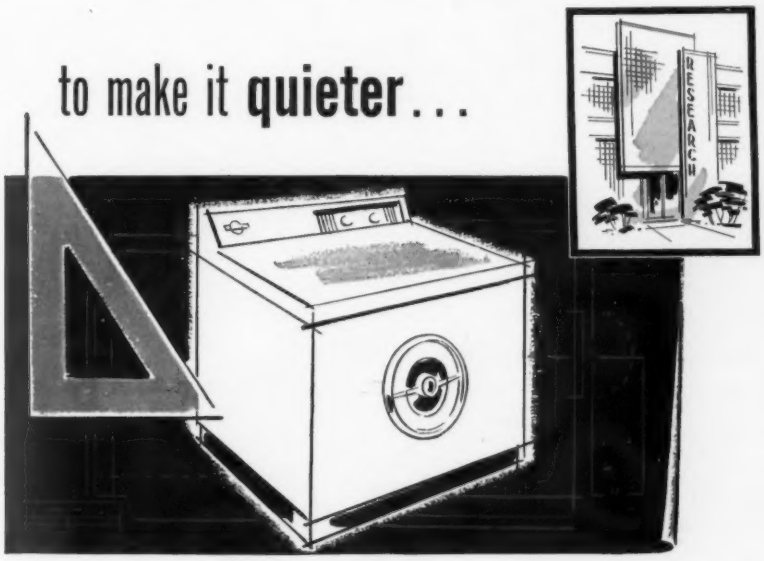
of "expanding appliance lines and intensifying products development and research."

Dr. Lawrence A. Philipp, vice president in charge of Kelvinator engineering, was named vice president of appliance engineering and research.

Dr. William Mikulas, assistant chief engineer, has been appointed chief engineer. As head of the Kelvinator engineering department, he will be responsible for all current product engineering and all immediate product development engineering.

Dr. Philipp will head long-range product development and research. In addition, he will act as consultant on appliance engineering for Nash-Kelvinator, including all divisions and subsidiaries. This will cover advisory work for Nash Motors in connection with their new automobile air conditioning system for both heating and cooling.

His consulting and research work



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Many products have been improved through simple, inexpensive design changes that capitalize on the sound absorbing qualities found in efficient Fiberglas* Insulations. You may find new sales opportunities, new competitive advantages for your product through better control of heat, cold and sound. And you can call upon the complete development and testing laboratories of the Owens-Corning Fiberglas Corporation for research and design assistance.

A look at the new Owens-Corning booklet, "Sales Opportunities," will give you a clue to the kind of product improvements that versatile Fiberglas makes possible. For your copy of this worthwhile booklet, contact the nearest Fiberglas office, or write direct to: Owens-Corning Fiberglas Corporation, Dept. 109E, Toledo 1, Ohio

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for products made of or with fibers of glass.

will cover different appliance fields. He will act as consultant to Altorfer Bros. Co., Peoria, Ill., home laundry equipment maker; Ranco, Inc., Columbus, Ohio, producer of heater and refrigeration controls; and appliance subsidiaries in Canada and England, as well as the parent company.

"The significant broadening of the Kelvinator, Leonard and ABC lines to meet the growing need of our dealers for a full line of appliances, has been accompanied by substantial expansion of our research, engineering and product development facilities," stated Mason, adding that "We are heavily increasing our investment in these programs to further step up the steady product advances on which United States industrial progress is based."

PERMUTIT OPENS NEW METALWORKING PLANT

The latest addition in a series of expansion moves — a projected $1,000,000 building program — was formally dedicated in Lancaster, Pa., on April 10 by The Permutit Company.

The new addition, a metalworking plant costing $750,000, is the preliminary step to the eventual creation in Lancaster of a complete industrial center for the manufacture of different Permutit products for the home, stated H. W. Foulds, president.

At the same time Foulds named J. Harrahill plant manager and F. K. Richardi assistant manager of the Lancaster, Pa., division.

A few months ago the company dedicated and opened a new hydraulic laboratory and pilot plant in Birmingham, N.J., for the purpose of testing ion exchange resins, water conditioning equipment, and to solve problems pertaining to the application of ion exchangers in process industries.

The latest move to Lancaster, said Foulds, was made to consolidate two similar operations and activities in Brooklyn and Philadelphia.

The new plant, with a floor space of 83,000 sq. ft., will utilize a novel "U" assembly line technique for the flow of materials in process from their receipt at the receiving platform, carrying through manufacturing, storage, assembly, testing and shipping. Lighting intensity can be increased or decreased at the will of the operator simply by adding or taking away some of the lighting fixtures. The lights will not be connected permanently into the lighting circuits. These were said to be but a few of many features initiated by George N. Proctor, vice president.

SINCERE SUCCEEDS FRIEDBERG ON EUMC RESEARCH PROJECT

John F. Sincere has been employed by the University of Illinois Department of Ceramic Engineering on the cooperative research project of the Enameled Utensil Manufacturers' Council. He received a B.S. degree in ceramic engineering from the University of Illinois in February, 1954, and will work toward an M.S. degree

It happens every day...
DESKS GET A BIG "KICK"
OUT OF EXECUTIVES
Relaxed feet help many executives solve the problems of the day . . . but they play havoc with the finish on a desk.
Thoroughly familiar with the working habits of the white-collar group, Corry-Jamestown Manufacturing Corporation designed a highly efficient working unit with many "executive-proof" features.
Even the smooth, hard, "heel-resistant" finish was specially formulated in the Arco Research Laboratory to endure the relentless footwork of men who make decisions.
speaking of decisions, you can't make a better one than to take your finishing problems to ARCO where experienced plant tailor quality paints to exacting specifications . . . and pre-prove performance by Arco Cycle Testing, a system which matches finishes to a degree unequalled in the industry. Write for full details.
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in addition to his research activities.

Dr. Arthur L. Friedberg, research assistant professor, was transferred from the EUMC project to a full-time appointment on the Engineering Experiment Station staff.

SMITH HEADS FRIGIDAIRE LAUNDRY EQUIPMENT SALES

R. H. Smith, formerly a zone sales manager, has been named sales manager of laundry equipment, according to H. F. Lehman, general sales manager, Frigidaire Division, General Motors Corp. He succeeds J. R. Cobb, who is heading up rural sales in the major dealer division of the appliance sales department.

MEYER FURNACE PROMOTIONS

Frank L. Meyer, president of The Meyer Furnace Co., Peoria, Ill., manufacturers of Marvellaire and Weir furnaces and air conditioners, has announced the following promotions:

Rose M. Wallis has been named vice president; Arthur R. Gilkerson, manager of heating and air conditioning division; and Brice W. Bain, assistant secretary.

PREFABRICATED HOME MFRS. ELECTS O'BRIEN PRESIDENT

John J. O'Brien, president of United States Steel Homes, Inc., was elected president of the Prefabricated Home Manufacturers' Institute at the 11th annual convention in Chicago, March 30.

Stainless MOULDINGS SPARK SALES!
INSIDE and OUT
Another in a series showing product appeal achieved thru metal mouldings.

Outside—a thin swirl of STAINLESS, custom made for a leading appliance manufacturer* accents the artistic contour of door front. Below—a bold wrap-around kick plate...both functional and decorative. Inside—standard mouldings add eye appeal and permanent brightness to freezer compartment. Chances are you, too, can spark sales with stainless...custom formed to your requirements by Pyramid. So why not send for *your* copy of the Pyramid Plan Book today?

*Name on Request.

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SEND FOR YOUR FREE COPY OF "PLAN BOOK OF METAL MOULDINGS"

No one connected with the design or manufacture of any appliance should be without a copy of this book containing hundreds of standard and special mouldings. Send for your free copy today.

Without obligation, please send copy of "Plan Book of Metal Mouldings." F-5

Name_____ Title_____

Firm_____

Address_____

Enamelers . . . → *from Page 60*

from 2 to 3% of moisture. The flux on the low hydrogen rods contains about ½ of 1% of moisture. It is important that low hydrogen rods be kept in dry storage until the time of their use. If they become wet or damp, they may be dried out again by heating them for several hours at about 700° F."

Kilgore said that the flux used in submerged arc automatic welding should be kept as dry as possible. "Any moisture present at the time of welding increases this absorption of atomic hydrogen," he pointed out. "Furthermore, when enameling steels are to be welded, steel with minimum gas producing constituents or impurities should be selected. Of these, sulphur causes the most trouble."

Chicago enamelers —*met March 20 at LaSalle Hotel. A. H. Meyer, of Benjamin Electric Mfg. Co., discussed "Metal Spinning", and Dr. I. A. Andrews, of University of Illinois, discussed "How to Develop New Ceramic Engineers for a Better Industry." Left to right: R. A. Fellows, of Century Vitreous Enamel Co., Club president; Meyer; Andrews; and John McLaughlin, of* finish, *program chairman.*

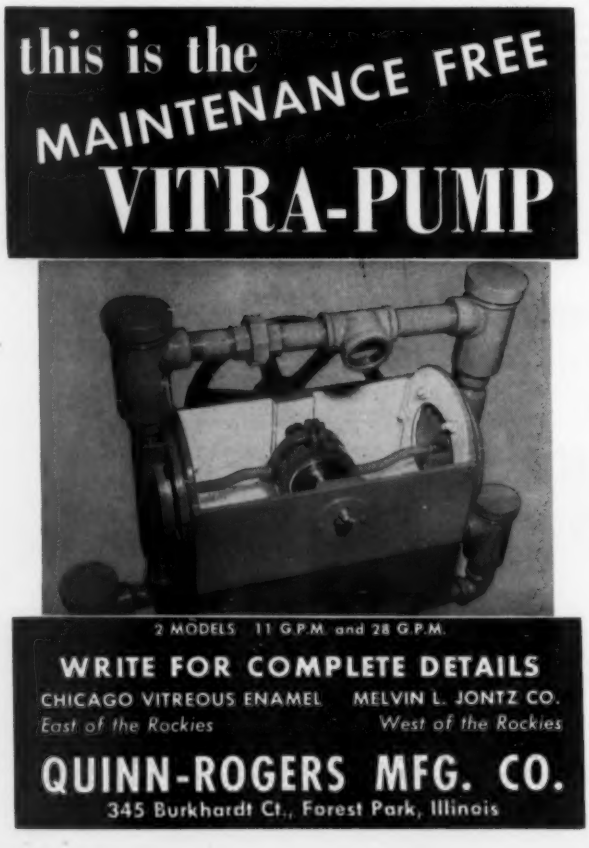
PEMCO INSTALLS PILOT PLANT FOR ENAMELING ALUMINUM

Installation of an aluminum enameling pilot plant has been announced by Herbert Turk, executive vice president, Pemco Corporation, Baltimore, manufacturers of porcelain enamel frit and colors.

Turk stated that the primary objective of the installation is to provide the enameling industry with technical information that is necessary for uniform results in the relatively new field of aluminum enameling. Further use will be made of the pilot plant in testing products and firing techniques, in color matching, in customer service work, in evaluation of mill batch formulations, and to provide another quality control check point on Pemco's products.

Convection-type "furnace" for close temperature control

In development of procedures for enameling on aluminum, it was found that while lower firing temperatures were possible (980-1000° F.), a vari-



WHY GET DIZZY LOOKING FOR HEAT RESISTING AND CORROSION RESISTANT ALLOY SPECIALISTS ?
ALLOYS, WHEN YOU CAN GET THE BEST QUALITY, PRICE AND DELIVERY FROM "ROLLED ALLOYS"
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ation of ± 5°, all through the furnace, was all that could be tolerated. Since existing radiation-type furnaces do not permit such close tolerances, and because existing furnaces cannot be adapted very readily, Pemco engineers consulted with several furnace manufacturers in designing and constructing a forced convection-type furnace that met the requirements set forth by Pemco engineers based on past experience.

While the installed pilot plant was built by the industrial heating division of General Electric Co., Pemco engineers are working with other furnace manufacturers by giving them advice and data on aluminum enameling as it affects furnace design.

ALFRED U. TO SPONSOR SYMPOSIUM ON PORCELAIN ENAMELS, JUNE 8-25

The N. Y. State College of Ceramics, Alfred University, Alfred, N.Y., will sponsor a "Symposium on Porcelain Enamels", June 8-25.

The tentative program is as follows:

Sheet iron enameling: June 8, "Operations and Equipment; June 9, "The Metal"; June 10, "The Metal Surface"; June 11, "The Enamel"; June 14, "Opacifiers" and "Enamel Compositions and their Development"; June 15, "Frits and Fritting" and "Milling and Application"; June 16, "Application and Decoration" and "Drying and Firing"; June 17, "Hydrogen and Iron, Gases in Enameling, Adherence, Trouble Shooting"; June 18, "Enameling Plants"; June 21, "Enamel Performance".

Cast iron enameling — June 22, "Wet Process and Dry Process" and "Characteristics and Tests".

Other enameling — June 23, "High Temperature Protective Coatings", "Chemical Ware" and "Applications and Prospects"; June 24, "Enameling Aluminum", "Jewelry Enamels" and "Enameled Art Ware".

Economics — June 25, "Production and Markets", "Outlook and Trends", followed by examinations for academic credit.

Registration for academic credit must be completed with the Registrar, Alfred University, by June 1.

A matriculation fee of $10 is charged those registering for academic credit. An additional fee of $50 for tuition is required of all except regularly enrolled students of the College of Ceramics. For attendance at part of the sessions, this is payable on the basis of $4 per day.

Reservations for attendance at the symposium, and requests for accommodations should be addressed to:

V. D. Frechette, Professor of Ceramic Technology, N.Y. State College of Ceramics, Alfred University, Alfred, New York.

LOOK TO DETREX FOR Service WITH A Saving

REMOVES RUST EASIER, FASTER . . . provides good surface for paint

Detrex "800" quickly, easily and thoroughly removes rust from metal *without* scratching or marring the surface. It also leaves a mild coating of phosphate on the surface which retards rust and provides a good base for paint finishes. Paint finishes last longer, look better.

Detrex "800" eliminates scraping, brushing and other costly hand operations used to remove rust from castings, forgings, sheet metal and all other metal surfaces.

You apply Detrex "800" by wiping, brushing or spraying it on . . . even by dipping the parts. After a few moments, rust wipes off as easily as dried liquid polish. Meets civilian and government specifications for surface preparation prior to painting.

FINE FOR PICKLING OPERATIONS, TOO . . . Detrex "800" Rust Remover Series presents none of the fumes of hydrochloric or sulfuric acids, yet is just as effective when used as a pickling agent.

Please send me literature on Detrex 800 Series and arrange to schedule a free demonstration in my plant.

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CITY AUTO STAMPING HEAD DIES

Charles C. Bigelow, 56, president of City Auto Stamping Company and City Machine & Tool Co., Toledo, died March 31.

He had been associated with the two Toledo firms for 25 years, and was well known throughout the appliance, automotive, aviation and other industries for which his companies produce metal stampings and dies.

PORCELAIN ENAMELERS LOOK TO CHICAGO MEETING

The mid-year divisional meetings of the Porcelain Enamel Institute will be held in May at the Edgewater Beach Hotel in Chicago.

The Sign Division will meet May 12; the Architectural Division, May 13; and the General Enameling Division, May 14.

The first day is for division members only, while the meetings on the next two days are open. A feature on May 13 will be preliminary presentation of the "Manual on Architectural Porcelain."

PAFFORD ELECTED HEAD OF AMERICAN CERAMIC SOCIETY

R. W. Pafford, vice president and general manager of production, Acme

Brick Co., was installed as president of the American Ceramic Society at its annual meeting held in Chicago, April 19-23.

Material: Clay Slip.
Problem: Short pump life caused by abrasion.
Solution: Moyno handles slip of 1.8 specific gravity—and gets about 1 year service on rotor and stator. Customers well pleased.

Material: Paint Primer and Surfacer.
Problem: Finding pump that would offer reasonable service life.
Solution: For past 2 years, Moynos have been pumping these abrasive materials at 40 p.s.i.—and maintenance costs are minimum.

Material: Special Navy Paint.
Problem: Low volume of gear-type pump; necessity for pre-heating paint before pumping.
Solution: Moyno cuts tank-car filling time from 10 hours to 2⅓ hours. No maintenance costs for past two years!

Material: Baking Enamel and Primer.
Problem: Recirculating abrasive material in closed system at 90 p.s.i.
Solution: Moyno pumps used successfully, with minimum repairs, for the past 4 years and are kept in operation 24 hours per day.

Four Industrial Finishing Problems Solved With The MOYNO PUMP!

Features of the MOYNO that may solve YOUR pumping problem

Positive Displacement — Moynos pull up to 29" vacuum while discharging under pressure. Big Moynos deliver up to 250 g.p.m. at pressures to 600 p.s.i.

Gentle — no churning; won't break up semi-solids; won't aerate liquids.

Reversible — pumps with equal efficiency in either direction.

Versatile — handles liquids, slurries, pastes—even potato salad! Rotor and stator available in stainless steel, other alloys, or plastics to meet wide variety of applications.

Trouble-Free — self priming; won't cavitate or vapor-lock. Just one moving part—no valves to stick, no pistons to gum up. Built for tough service. Easy to maintain.

Looking for a pump with a fast-growing reputation for solving tough problems? Take a look at the simple, versatile Moyno!

Briefly described above are a few of the many successful case histories proving how Moynos handle jobs where other pumps failed. Why is the Moyno a "problem-solving" pump? For one thing, because it differs completely from conventional pumps—rotary, centrifugal or piston. Just one rugged moving part—a rotor turning within a stator—does the job.

If *you* have a pumping problem caused by abrasive or corrosive materials—watery, viscous or even semi-solid—find out if the Moyno can help you! Mail the coupon.

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Robbins & Myers, Inc. F
Pump Division, Springfield 99, Ohio
Gentlemen: Please mail free copy of Bulletin 30-B containing details on construction and operation of Moyno Pumps:
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*Company*_____
*Address*_____
*City*_____ *State*_____

Metal stampers . . .

→ *from Page 65*

Wallace A. Stanley, executive assistant to the president, Progressive Welder Sales Co.; S. C. Rockafellow, vice president, Robotron Corp.; and J. J. MacKinney, electric engineer, The Budd Company.

Stanley, discussing the subject of *design*, said that resistance welding equipment has to be tailored to fit the job. Before a designer can specify the use of resistance welding, he must know the different welding processes —spot, projection, seam, flash and butt welding, and then the specialized forms of resistance welding, such as percussion welding, electroforging, electrobrazing, etc.

He then emphasized the importance of welding in industry today by stating that there are 11,000 spot welds in a modern car compared to 6,400 welds in a pre-war car. He

concluded his part of the program with a series of slides showing how easy it is to design a fabricated metal product to make welding both convenient and economical.

The subject of *control functions* of a control panel for resistance welding was discussed by Rockafellow, who stressed the fact that the correct use of the control functions can make the difference between good and bad welds.

Regarding the consistency and life that can be expected from electronic controls, Rockafellow related that about five years ago his company made a number of controls for welding just the keys on coffee cans. Two of these original controls have been in use for over four years, welding all day long, without changing a tube in the controls. The can manufacturer figured out that each of the two controls has gone over 4,000,000,000 operations thus far. "So don't be afraid of electronic controls," concluded Rockafellow.

The use of resistance welding in *production* was MacKinney's subject. His talk was illustrated by slides showing the use of welding in the Budd plant, and was followed by a sound movie on welding operations in the Budd plant.

PLASTIC DIES

The final panel discussion was on "The Progress and Possibilities of the Use of Plastic Dies in the Stamping Industry."

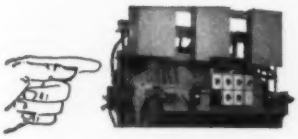
Moderator was John B. Kendall, plant manager, Buffalo stamping plant, Ford Motor Co.

Speakers included Fred Lyijynen, supervisor of experimental plastic division, Chrysler Corp.; J. F. O'Reilly, manufacturing research department, Ford Motor Co., George M. Rice, sales manager, Renaud Plastics, Inc.; Edsel Ruddiman, gage unit of engineering plant, Ford Motor Co.; and Robert Voss, president, Warren Plastics.

Kendall, Lyijynen, O'Reilly, and Ruddiman covered the use of plastic tooling in production work, while Rice discussed the merits of *epoxy* resins, and Voss presented the advantages of *phenolics*.

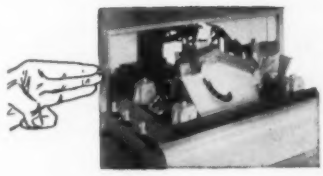
HERE'S A WELDERFULL OF IDEAS

Ideas that speed production — safely —at less cost. Here's resistance welding machine design at its finest. Compact — readily installed — accessible for maintenance — safe and easy to operate — fully automatic. Just a few of the features that make Federal machines first in resistance welding.



All electrical connections readily accessible and compactly arranged in their enclosures for transformer primary leads, electrical accessories terminal board and a "quick disconnect" terminal board for the main control panel. Centralized control station with safety spaced dual start buttons. Emergency cord for instant stopping of machine.

Flash guard moves down to seal off weld area protecting operator and machine. Flexible curtain unrolls with fixture travel to shield slide ways. Body bumper emergency stop. Leg area shield protection.



Booted gun piston rods hardened and ground and equipped with scrapers to avoid weld flash pick-up. Capped electrodes. Guided piston rods for offset loads. Double acting hydraulic gun cylinders. Air and water hose to fixture kept clear of work area.

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APPLIANCE TECHNICAL CONFERENCE IN CHICAGO, MAY 17-19

The 5th annual Appliance Technical Conference will be held May 17-19, at the Morrison Hotel, Chicago. This annual event is sponsored by the Committee on Domestic and Commercial Applications of the American Institute of Electrical Engineers. The purpose of the meetings is to air problems of engineering, testing and usage as well as bring about a closer mutual understanding among all segments and members of the appliance industry.

Overall theme of the 1954 conference is *"Performance, Testing and Standardization."*

Appliance spokesmen — such as J. C. Sharp, president, Hotpoint Co.; C. V. Krichton, Toastmaster Products Division, McGraw Electric Co.; W. E. Mahaffay, Whirlpool Corp.; and B. F. Parr, Westinghouse Electric Corp. — are among those who will participate.

Several papers to be presented are expected to bear considerable influence upon the industry representatives. "Appliance Problems from the Customer's Viewpoint", by Miss Bernice Strawn, home equipment editor, *Woman's Home Companion*, will spotlight new problems that have risen in the past year. A panel discussion on this subject will include G. S. Hill, manager, refrigeration engineering, General Electric Co.; W. E. Mahaffay, Whirlpool Corp.; and H. A. Strickland, vice president, engineering, Hotpoint Co.

Other presentations of interest include "Practical Tests for Clothes Dryers" by W. E. Duvall, Sears, Roebuck & Co.; "Appliance Testing from a Utilities Viewpoint" by R. C. Bryce and Frank Kahn, Philadelphia Electric Co.; and "Automatic Washer Testing" by R. H. Gabrial, General Electric Co.

During the three-day conference, plant inspection trips to Underwriters Laboratories, Hotpoint Co., Dole Valve Co., and Sears, Roebuck & Co. will take place.

Combines temperature control with single pole switch. Current is automatically cut off and switch is locked in open position if temperature at any dial setting, through any cause, exceeds temperature range of control by approximately 7% in liquids or 12% in air. Switch remains open until closed by manual reset button. Design permits mounting control in any one of four positions. Standard size bulbs and capillary tube lengths give great flexibility to meet required heat ranges and installation needs. In direct or reverse acting models. *Write for Catalog.*

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N. W. CHEMICAL NAMES WILSON

Northwest Chemical Co., Detroit, has announced the appointment of Marion F. Wilson to the sales staff to service accounts in Kentucky, Tennessee, and parts of Indiana.

For the last several years Wilson has worked with the metal finishing industry. This experience has been augmented by special training given by the company. He is a member of the American Society of Tool Engineers.

WESTINGHOUSE TO BREAK GROUND FOR METALS PLANT

Westinghouse Electric Corp. will break ground in May for construction of its new multi-million-dollar metals plant at Blairsville, Pa., it was announced by Warren M. Trigg, plant manager. The main purpose of the new plant will be to bridge the gap between research and the commercial application of metals in the electrical field, stated Trigg.

Edison Electric Institute told of five-year goal of 428,000,000 appliances

AT THE 20th annual sales conference of the Edison Electric Institute, held April 5-8 at the Edgewater Beach Hotel, Chicago, Roger H. Bolin, advertising manager, Westinghouse Electric Corp., told of the industry's goal of 428,000,000 appliances in the next five years.

The industry, which produced 338,000,000 electrical appliances since 1949, today has the capacity to reach its five-year goal, stated Bolin, who pointed to the industry's 65% increase in factory square footage in the past five years. Today, the appliance, radio and television manufacturers have a combined factory square footage of 89,000,000 square feet.

Need to sell to survive

If the industry is to meet its goal, it is going to have to sell . . . and sell hard, emphasized Bolin. "I believe there are two parts to this selling job. One is to *sell the product*, and the other is to *sell the full use of the product*."

Appliance, radio and television manufacturers have to sell to survive because when they committed themselves to step up their plant capacities, they automatically entered one of the most competitive sales races this country has ever seen, stated Bolin.

Bolin then told utility executives that "now is the time for utilities to re-employ mass demonstrations" in order to sell the full use of appliances. "Now you have the magic of television where you can give a close up 'how-to-do-it' demonstration to your customers right in their own homes."

Depend on selling — not excise tax reductions

Parker H. Ericksen, Avco Mfg. Corp. vice president and general sales manager of appliances for Crosley and Bendix, told the EEI convention that the recent reductions in excise taxes should not be considered a "cure-all" for the current problems of the appliance dealer.

While excise tax reductions may help to stimulate business, first quarter retail results show that appliances in the $500 class with new conveniences and work-savings advantages are outselling lower priced models with ordinary features. This is true even among low-income families, stated Ericksen.

Price not major motivation in consumer buying

A sampling of more than 3,000 families which bought new refrigerators recently showed that price was the major motivation for the model purchased in only 25% of the cases, said Ericksen, who added that half of the remaining 75% said the refrigerator's features were the chief reasons for buying, while brand preference and recommendations of friends motivated the others.

...a jewel

...befitting the product it adorns

Yet practical and profitable, for it's

NOT JUST A "NAME PLATE"

. . . but the pinnacle of your product design.

Your name plate is a salesman making a call whenever and wherever it's seen and admired.

And that's everywhere when your name plate is made by *American Emblem Co., Inc.*

Write now for more information about the finest decorative nameplates, trim and escutcheons in the world. BY . . . . . .

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City _____ State _____

LARGEST ADMIRAL EXPANSION ANNOUNCED BY SIRAGUSA

The largest expansion program in Admiral Corp.'s history has been announced by Ross D. Siragusa, president and chairman, who added that details could not be disclosed yet, except that it will get under way late this year and be completed early in 1956.

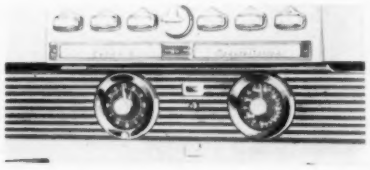
LP-GAS ASSN. SET FOR RECORD TRADE SHOW

A total of 218 booths, an all-time record, are under contract for a mammoth exhibit of LP-gas appliances and equipment to be held in conjunction with the annual convention of the Liquefied Petroleum Gas Association.

The convention will be held at the Conrad Hilton Hotel in Chicago, May 9-12. Guest speakers will include Douglas R. Stringfellow, Utah congressman, and Dr. Bergen Evans, of Northwestern University, and moderator of the "Down You Go" television program. M. L. Trotter, LGPA president, will preside.

LUX CLOCK ANNOUNCES "1-2-3" COOKING CONTROL

The Lux Clock Manufacturing Co. has announced a new automatic cooking control for gas and electric ranges. The control provides "automatic cooking" with three dials which tell "how hot", "how long", and "how soon."



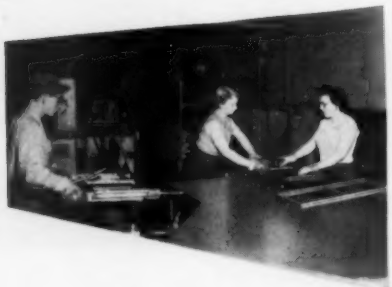
The three dials can be set in any order. The first is a temperature control. The second controls the cooking time, and the third provides, if necessary, for cooking to begin from 15 minutes to 12 hours later.

Photo shows the new control in the back panel of a gas range made by Mount Vernon Furnace & Mfg. Co., Mount Vernon, Ill.

SPRING WELDING MEETING AND SHOW, MAY 4-7

The national spring meeting of the American Welding Society will be held at Hotel Statler, Buffalo, N.Y., May 4-7, concurrently with the second Welding Show at the Memorial Auditorium.

Thirty-nine papers on various aspects of welding will be presented. Major topics to be covered are weldability, inert arc welding, resistance welding, welding of stainless steel, surfacing and metallizing, pressure vessels and pennstocks, welding of titanium, structural welding, welding processes and equipment, welding of non-ferrous metals, welding of piping and tubing, and a session on welding applications.



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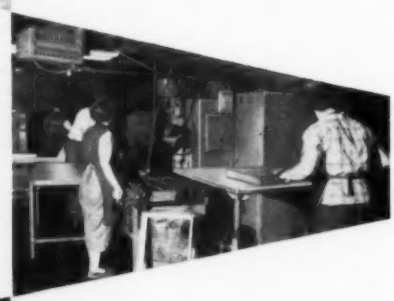

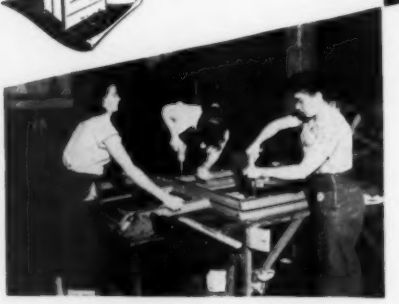

We offer you a service that can take a complete unit, a component part, or a single stamping, from your now over-crowded production line and deliver back to you a packaged deal, ready for shipping—or a complete sub-assembly ready to be coordinated into your main assembly line. You'll find that using New Monarch's facilities is much more economical than making costly expansions in your own plant.

You may avail yourself of any one or all of our services according to your specific needs. Write today for The Monarch Story of Stampings, just off the press. It will give you, most explicitly, a better picture of the many ways in which New Monarch can be of service to you. No obligation.

New Monarch's from-blueprint-to-shipping-carton service includes dies, tools, stampings, assembly, finishing and packing. Send blueprints for estimate.

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NEW JORDON REFRIGERATOR PLANT SET TO OPEN IN MAY

Formal opening of Jordon Refrigerator Co.'s new plant, in Philadelphia, has been set for May 22, it was announced by Frank Fogel, president. The official opening of the 150,000 sq. ft. plant will mark the 10th anniversary of the company.

NANSEN, OF ROPER, DIES

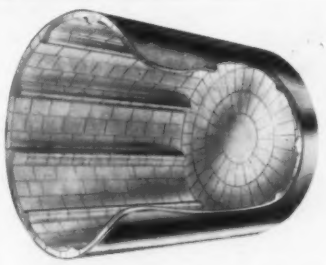
Cliff Nansen, 53, head supervisor in the forge plant of the Ordnance Division, Geo. D. Roper Corp., Rockford, died March 8. He joined the Roper organization in 1935 as enamel foreman.

TENNESSEE STOVE ANNOUNCES GOLDEN ANNIVERSARY RANGES

Tennessee Stove Works, Chattanooga, this year celebrates its 50th year with a new line of gas ranges. Distinctive of the new line is high backguard styling with a new "Servi-Shelf" as an optional feature.

HIGH DENSITY MILL LINING ANNOUNCED BY COORS

A new mill lining brick, made of a high density aluminum ceramic, has



been announced by Coors Porcelain Co., Golden, Colorado.

Coors states that engineering features of the new lining include "double size shell brick, new radial head brick design, and integral lifter bars." It is added that the lining is made of "service tested ceramic used in the manufacture of Coors grinding media."

It is further reported that "the center of the mill head is a 12" diameter disc shaped brick around which the radial brick are laid on concentric rows or courses. These radial brick are approximately 3½" wide by 6" long (radially) . . . Also, the radial brick are made in the 3" length for use as fill in brick when lining the heads of 30", 42", 54", etc. diameter mills. The sides of edges of all radial brick are tapered to coincide with a radius of the mill."

TAPPAN STOVE DEVELOPS AN ELECTRONIC RANGE

The introduction of an electronic range which among other things can "bake a cake in three minutes in a cold oven" has been announced by The Tappan Stove Co., of Mansfield, Ohio.

According to Alan P. Tappan, president, it's the first electronic range designed for the home kitchen. It was developed in conjunction with Raytheon Mfg. Co., of Waltham, Mass.

The range has a magnetron tube which transmits ultra high frequency waves which are said to cause "molecular agitation" in food the same way that heat does, except faster.

When it gets in quantity production, Tappan officials estimate that the price of the range will be about $1000.

RESIN CHEMIST KEEPS AN OPEN MIND ON OPEN JARS

To the open mind

. . . and seasoned eye of Ferbert-Schorndorfer's veteran resin chemist, Eugene H. Ott, these open-mouth jars of aging synthetic resins reveal the relative stability of various modifications for dip tank application.

This young Resin Research Director has devoted seventeen years at F-S developing quality vehicles for custom finishes. "There's no mystery or hidden art behind today's resins," states Gene Ott, "they are scientifically formulated . . . and possibilities for variations are practically limitless!"

His firm conviction that a product finish is no better than its resin, makes Gene a valuable man to F-S customers . . . for it is *men* more than any other asset, that make F-S a company you'll like to deal with.

At F-S, you will always find an "open mind" attitude toward your product finishing problems. Next time, write or call:

THE FERBERT-SCHORNDORFER COMPANY

12815 Elmwood Ave. F-S Cleveland 11, Ohio

A DIVISION OF AMERICAN-MARIETTA COMPANY

Resin bonded chemical treatments - wash primers

(Continued from Page 68)

galvanized steel, the zinc chromate type is slightly superior on exposure in salt atmosphere, but the chromic phosphate is slightly superior on exposure to high humidity conditions. They are about equal on exposure to atmospheric weathering.

Analyzing this a little further, the results show that the lead chromate type is the best choice for treating steel that is destined for marine exposures whereas for other types of exposures the results are about equal. Hence, for the sake of convenience and utility most people would probably choose the single package product. Where we are treating either aluminum or galvanized steel, the choice between the zinc chromate type and the chromic phosphate type is just about a toss up. Again, however, most users would probably choose the stable variety. One thing to be noticed, however, is that on aluminum and galvanized steel the zinc chromate type does show better initial adhesion than the chromic phosphate type. Apparently, the zinc chromate type develops maximum adhesion very soon after drying. By contrast, the chromic phosphate type is slower in developing maximum adhesion to where it is on a par with the zinc chromate type.

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Timely FINISHING TIPS
The secret of completely mechanized production is — NARACO. Racks and Fixtures engineered by NARACO gave this leading Appliance Manufacturer fast, efficient handling with superior quality on all finished surfaces.
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Between primer and metal

We have considered different types of wash primers, and we have considered their application to different types of metals. Now let's consider for a moment what may be in between the wash primer and the metal to which we think we are applying the metal treatment. It is probably very seldom that we get or can expect a completely clean metal surface. The contaminants that are present can be a wide variety of things such as oxide films in the form of rust or scale, vegetable oil or mineral oil lubricants and drawing compounds residue from a cleaning operation and moisture.

Many of you have probably heard it said that wash primers are not particularly sensitive to surface contamination. That statement is true, but it should be qualified. For example, considerable quantities of mineral oils on the metal surface can be tolerated by wash primers, since they have the unique property of displacing the mineral oil film from the metal surface and then depositing that oil film on top of the wash primer. The critical point here is the tolerance that the successive coats of paint have for the mineral oil. Usually, solvent wiping of mill-oiled surfaces removes sufficient oil to allow top coats to adhere satisfactorily to the wash primer. Vegetable oil, rolling lubricants and drawing compounds are not displaced to the surface of the wash primer in this manner, but since they are compatible with the wash primer film, they are incorporated into it. The incorporation of this oil into the film has a plasticizing effect, hence excessive quantities would be harmful. Again, solvent wiping usually is a satisfactory remedy.

Wash primers show a remarkable freedom from being adversely affected by residues left on the metal surface by alkaline cleaners or by rinsing in hard water. The rinsing stage in a cleaning operation would have to be very badly contaminated before it would have an effect on the per-

formance of the wash primer. This is in marked contrast to the performance of an ordinary chemical metal treatment. Wash primers can also tolerate a considerable amount of water on the metal surface without any adverse effect. However, the amount of water tolerable will depend upon the method of application. For instance, if wash primer is applied by dipping or spraying over a very wet surface, a local over concentration of water will result in precipitation of resin and detract from performance. However, if the same material is brushed over a very damp surface, the brushing action allows the water to be mixed in with the wash primer and it then evaporates along with the solvent.

Thus, there are definite limits as to how much water wash primers will stand. In addition to the water actually laying on the surface of the metal to be treated, more can actually be introduced into the film by condensation. This becomes a special problem if the metal surface being treated is very cold in comparison with the atmospheric temperature and at the same time the humidity is high. Thus, where it is necessary to apply the wash primer under conditions of very high humidity, moisture difficulties can often be minimized by simply heating the metal.

When we come to the consideration of contamination in the form of rust and scale, the picture is not quite so favorable for wash primers. It is fairly well recognized today that rust and scale are very poor surfaces over which to apply finishes of any kind, but sometimes it has to be done. Actually, the use of wash primer does not add greatly to the performance of paint systems when applied over rusty, scaly steel. The exception to this statement is the case where specific primers and finish coats can be used over the wash primers. There are systems based on wash primers which are specific in their ability to protect rusty and scaly steel. But for the most part, the old standby of red lead in raw linseed oil out-performs everything else when it is necessary to paint over surfaces that are contaminated in this manner.

Which paints give best top coats

Now let's consider for a moment what goes over top of the wash primer. It can be said with complete confidence that the use of wash primer will upgrade the performance of most paint systems. Among the different types of wash primers that we have mentioned, there are some differences with regard to their ability to accept different types of top coats. The zinc chromate type is the most versatile in this respect, and to the best of our knowledge, all types of paint vehicles will adhere to it very satisfactorily with the exception of acrylics. The conventional lead chromate type has the most limitations and specific top-coat systems should be tried over it before being recommended. Certain formulations involving chlorinated rubber, nitrocellulose and styrenated alkyds are most prone to give trouble. The two chromic phosphate types are intermediate between the zinc chromate and lead chromate types in their ability to accept various top coats. As a group, the vinyls perform best over all of the wash primers. Vinyl intermediates and top coats seem to go hand-in-glove with wash primers and results can be obtained that are out of proportion to what might be predicted in advance.

Adapted from a presentation before the Industrial Finishes Symposium at the Case Institute of Technology.

Just 1/6 th the Drying Time with PAN-L-HEAT!
Application: Drying the water out of just-poured cement molds of insulating refractory chambers at Kolb Refractories, Philadelphia, Pa.
Results: States Mr. William Kolb, "By adding a Jensen Pan-L-Heat oven to our production cycle, we were able to cut the time the cement was in the mold from 4 hours to 40 minutes. In addition, we got better uniformity and reduced the number of molds needed by one-third."
YOUR PLANT CAN HAVE
• Increased pay load realization.
• More effective use of electric heat.
• Uniform, high quality production.
• Superior results with shorter heating cycles—at lower energy consumption.
"Quick, uniform drying is possible through the penetrating radiant qualities of our 28-ft., 128-KW Pan-L-Heat oven."
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NEWS ABOUT SUPPLIERS

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K. M. LEUTE

CLAWSON TO HEAD FERROD, FERRO ELECTRIC, TUTTLE & KIFT

R. A. Weaver, chairman, Ferro Corp., has announced the appointment of C. D. Clawson as president of Tuttle & Kift, Inc., Ferrod Corp., and Ferro Electric Corp. Weaver is also chairman of the three firms which are wholly-owned subsidiaries of Ferro. Clawson is also president of Ferro.

It was stated that Clawson's appointment will serve to coordinate the research and development, engineering, marketing, and sales of electrical products of the three companies. Tuttle & Kift produces surface cooking units. Ferro Electric makes range switches, controls and open-coil oven heating units, as well as heating units for air conditioners and clothes dryers. Ferrod produces industrial heating units.

COWLES APPOINTS PYNCHON

Cowles Chemical Co., Cleveland, has named Richard N. Pynchon as advertising and sales promotion manager, succeeding Elmer A. Lord, who is sales representative in heavy chemical department.

PROMAT NAMES KAHLER

Promat Division of Poor & Co. has appointed Harold A. Kahler general sales manager of the eastern division.

Promat also named Industrial Materials Co., San Francisco, as northern California distributor for Promat metal finishing processes.

DETREX UPS CHRISTENSEN

Detrex Corp. has named R. H. Christenson as sales and service representative of the chemical processing division in the east-central region. He has been with the division for two and one-half years.

MARKERT, OF FERRO, DIES

Fred S. Markert, 53, executive vice president, Ferro Corp., Cleveland, died March 30.

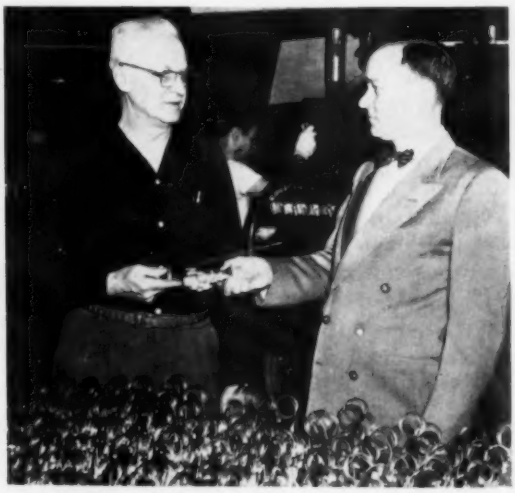
Markert has been Ferro's chief operating officer for about a decade. His entire connection with the company during his 27 years of service had been in the operating division.

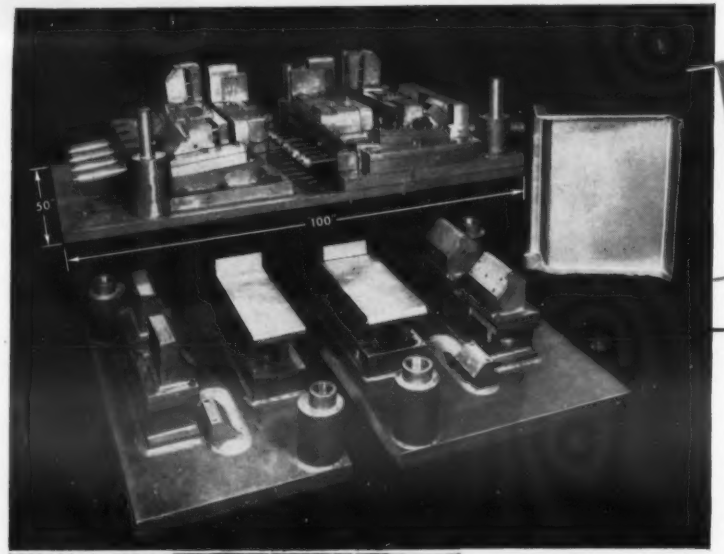
LITHIUM CORP. HEAD DIES

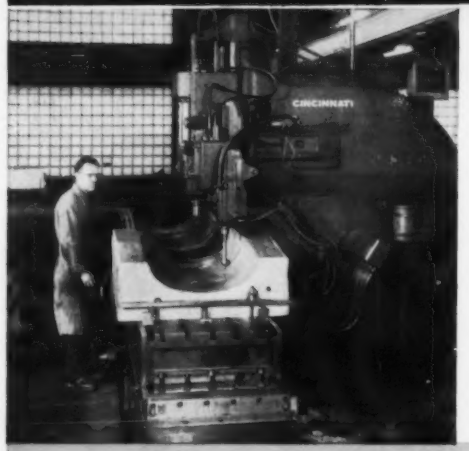
Karl M. Leute, president of Lithium Corp. of America, died March 24. In 1942, Leute founded Metalloy Corp. which was later to become Lithium Corp.

Ultrasonic degreaser show *— has been put "on the road" by Detrex Corp. to tell industry of the new method for precision cleaning of metal. As plant men watch, K. D. Collom and D. C. Johnson (3rd and 4th from left) demonstrate speed with which sound energy degreases a metal part.*

15,000,000th BJ thermostat *— made by Robertshaw-Fulton Controls Co. is presented to W. D. Miller (right), asst. vice pres. The combination gascock and temperature control is said to be used by 64 leading gas range mfrs.*







ABOVE: Typical tooling job is the Cam Flange Die shown above. This is an adjustable die to cam flange both sides of three different sizes of range tops with one stroke of the press for each top.

LEFT: Showing work done on a typical job—using a 28" x 96" Cincinnati Vertical Hydro-Tel, with automatic tracer and depth control.

Designers and Builders of Dies, Tools, Jigs, Fixtures and Special Machines

Rx FOR COMPLEX STAMPING AND PRODUCTION HEADACHES

EFFICIENT *Tooling*

● A good prescription for your "tough", troublesome stamping problems . . . is EFFICIENT TOOLING. You can eliminate production headaches—simplify your stamping operations—reduce production costs—with ingenious well-constructed dies and tools by EFFICIENT.

Our organization has the know-how, the experience, the engineering skill to tool your most complicated parts to your best advantage.

Our large modern plant has complete machine facilities to meet your requirements. Our up-to-the-minute equipment includes tryout presses up to 300 tons capacity. Sample parts are delivered for your approval before dies are shipped to you.

Consult us on your tooling problems or write for full information.

THE EFFICIENT TOOL & DIE COMPANY

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At Macco Products open house — *held March 21 at their new new Chicago plant — hosts included, left to right, M. C. Burak, Harry A. Dolske, Maurice Loeffel, and G. A. Cairns, general manager. The new plant affords Macco a 150 per cent additional production capacity. The firm produces drawing compounds, cutting oils, cleaning and rust-proofing solutions.*

No 3-D glasses required

reading time 1 minute — looking time is up to you

by • The Wrangler

The boss man aint giv me no chance to scribbel fer so long thet I'm plumb out of practise.

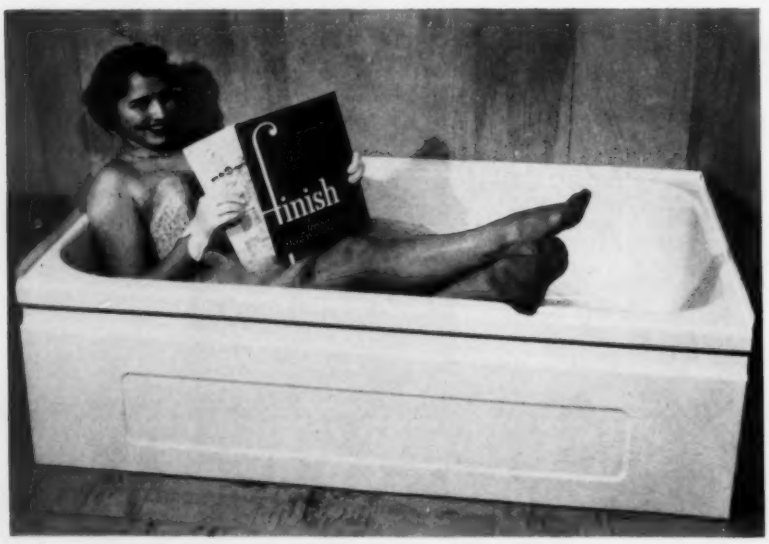
When this here photegraf cum in to the *finish* offices I jest plane up and deemanded a chancst to punch out a cuple uv lines.

We noed our sheet wuz purty populer with the men folks but "WOW"— *we got new customers.*

This photegraf cum into us from Hart Metal Products Corporation at Elkhart, Indiany, and the boss man puts the blame on the cumpany's president Thur Schmidt.

I allus noed Schmidt's outfit bilt beutiful steal bath tubs and cumplete bathrooms for trailers but I sure wuzn't up on the fact thet a gal goes with every spankin nue tub.

I'm gonna put in notice now and send me a order fer a bran nue trailer bathroom *cumplete.*



MERIT AWARD TO ARMCO

Armco Steel Corp. has received an "Industrial Award of Merit" from the Ohio Conservation Congress for its efforts to eliminate stream pollution and restore Ohio's vital water resources.

CARBORUNDUM UPS TONE, KEELER

F. Jerome Tone, Jr., was made senior vice president and Frederick T. Keeler was appointed director of sales for The Carborundum Co., it was announced by Clinton F. Robinson, president.

PENNSALT UPS DRAKE, CLEM

William P. Drake was named president of the industrial chemicals division, and Albert H. Clem becomes president of the chemical specialties division, Pennsylvania Salt Manufacturing Co., it was announced by George B. Beitzel, president.

JERVIS B. WEBB APPTS.

J. C. Webb, president and general manager of Jervis B. Webb Co., has announced the promotions of E. W. McCaul to vice president of sales, and George Webb to Michigan regional sales manager.

DETROIT BRASS CHICAGO MGR.

Detroit Brass and Malleable Co. has announced the appointment of J. H. Silverman as Chicago district sales manager.

PIERRE DUPONT DIES

Pierre Samuel du Pont, industrialist, philanthropist and head of the du Pont family died April 5 at the age of 84.

At the turn of the century, he acquired E. I. du Pont de Nemours & Co. with his two cousins, Alfred I. and T. Coleman du Pont. At his death he was a director and honorary chairman of the board.

The era of Pierre, Alfred I. and T. Coleman du Pont was followed by the period of the company's greatest diversification and growth under the direction of Pierre and his two brothers, Irenee and Lammot. Now only Irenee survives. Lammot, the youngest, died in 1952, the year the du Pont firm celebrated its 150th anniversary.